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Doi et al.

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(54) **ELECTRICAL CONNECTOR**

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(73) Assignee: **HIROSE ELECTRIC CO., LTD.**, Tokyo (JP)

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(30) **Foreign Application Priority Data**

Aug. 9, 2013 (JP) 2013-166099

(51) **Int. Cl.**

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H01R 24/60	(2011.01)
H01R 13/631	(2006.01)
H01R 107/00	(2006.01)

(52) **U.S. Cl.**

CPC ***H01R 13/24*** (2013.01); ***H01R 13/6315*** (2013.01); ***H01R 24/60*** (2013.01); *H01R 2107/00* (2013.01)

(58) **Field of Classification Search**

CPC H01R 13/6315; H01R 13/631

See application file for complete search history.

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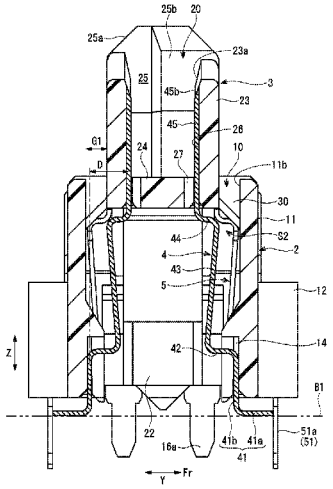
(57) **ABSTRACT**

An electrical connector includes a fixed housing to be fixed to a board; a movable housing arranged to be movable relative to the fixed housing; and a plurality of terminals disposed between the fixed housing and the movable housing. The terminal includes a connecting portion held with the fixed housing; a first curved portion connected to the connecting portion; a terminal portion held with the movable housing; a second curved portion connected to the terminal portion; and a inclined portion connected between the first curved portion and the second curved portion so that the first curved portion is curved in a direction opposite to a direction that the second curved portion is curved. The inclined portion is inclined so that an angle between the inclined portion and the first curved portion or the second curved portion becomes an acute angle.

5 Claims, 11 Drawing Sheets



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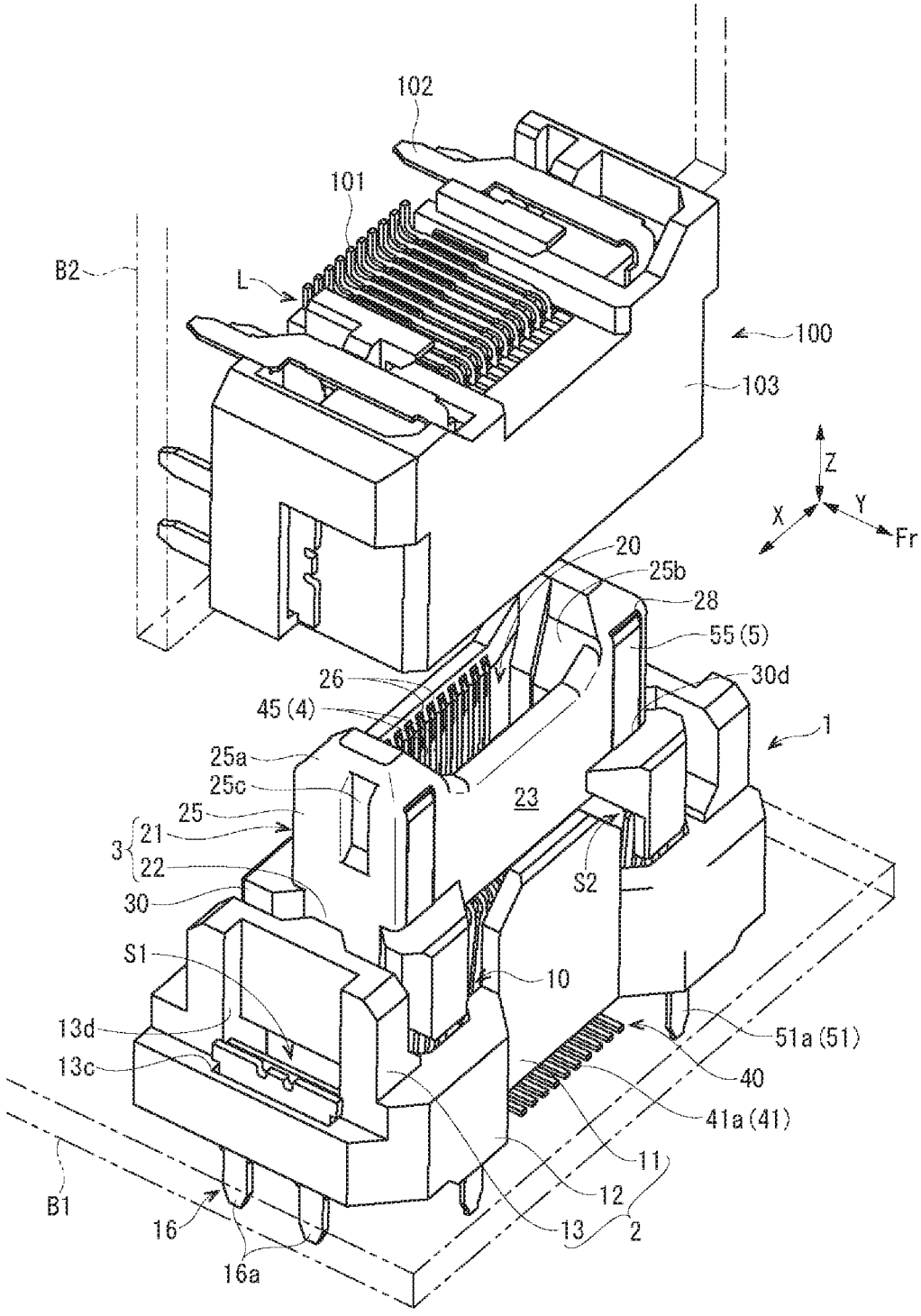
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101
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L
100
103
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Y
Fr
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28
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30d
26
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1
25a
25c
23
25
3
21
22
30
S2
S1
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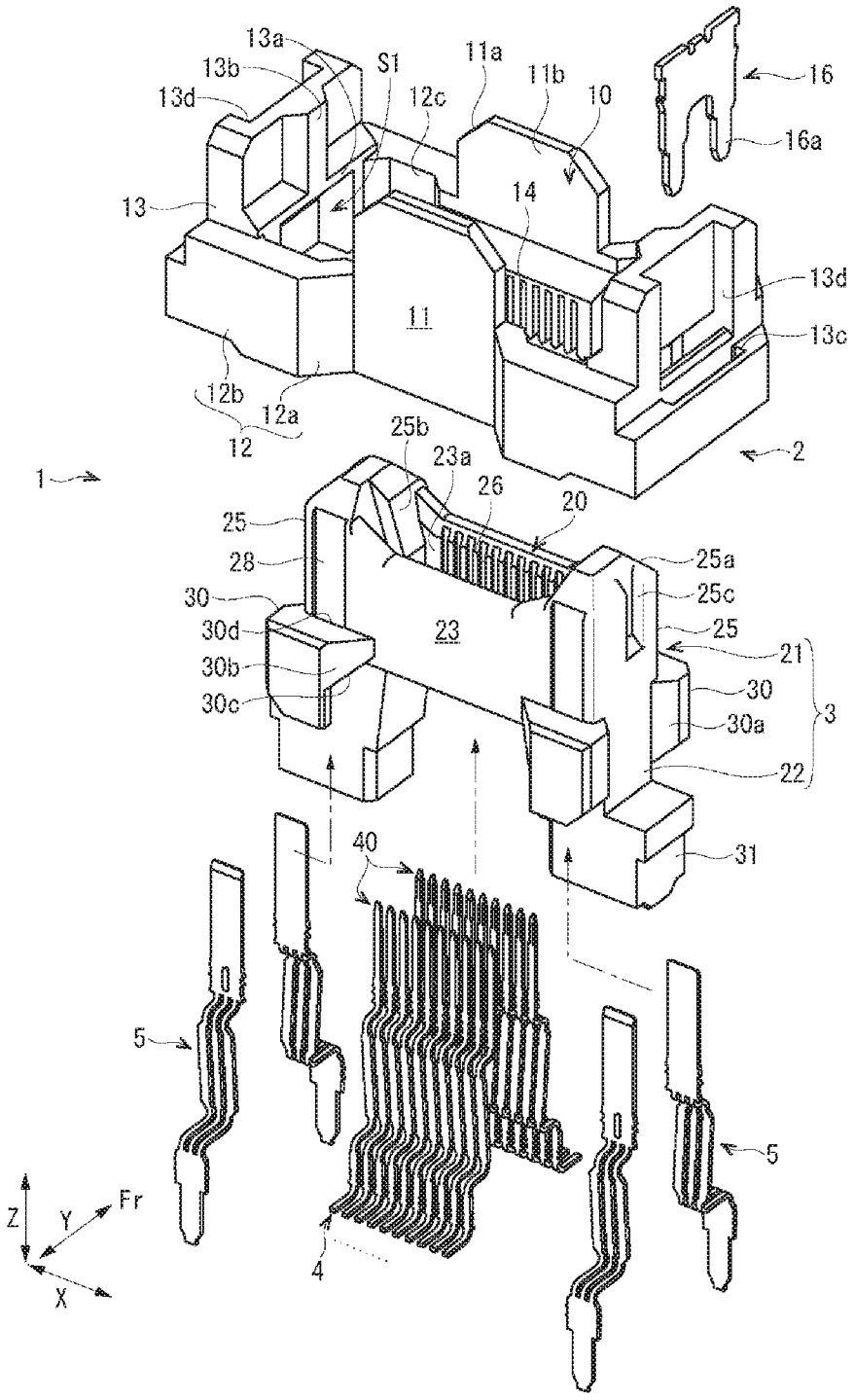
13d
13c
51a (51)
40
41a (41)
11
12
13
2
B1
16
16a

FIG. 1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25a
25c
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30d
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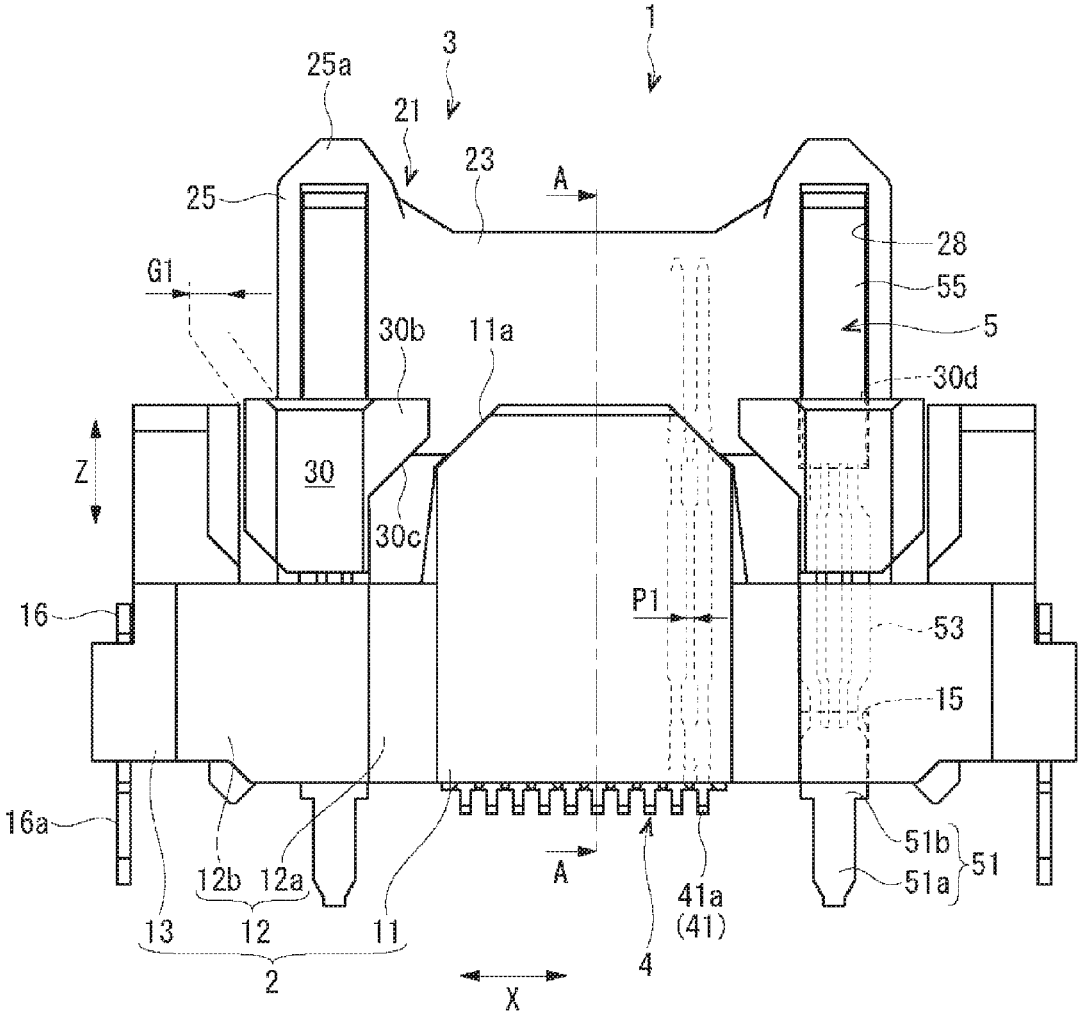
FIG. 2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53
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51a
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41a
(41)
13
12
11
4
2
X

FIG. 3

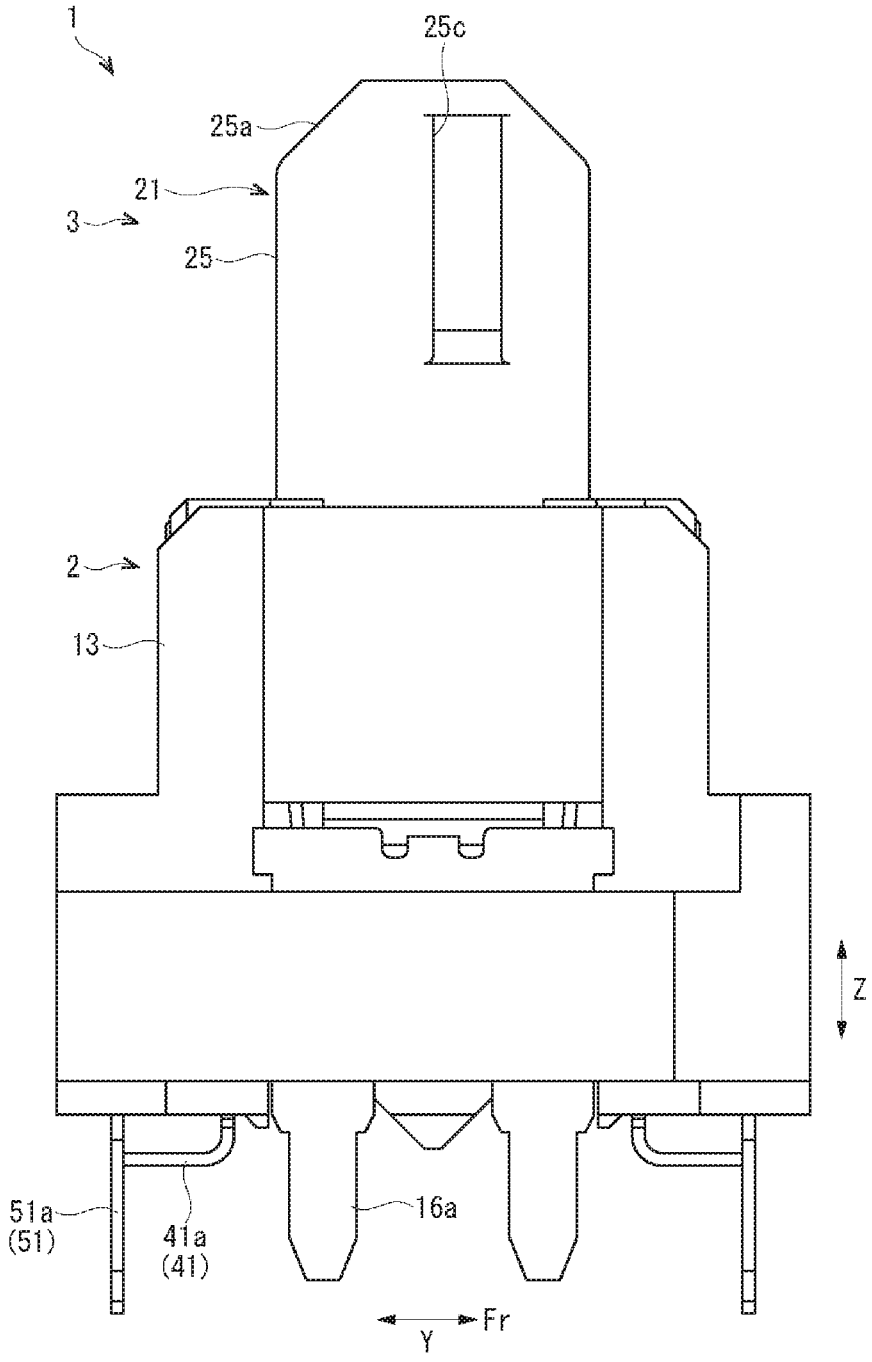
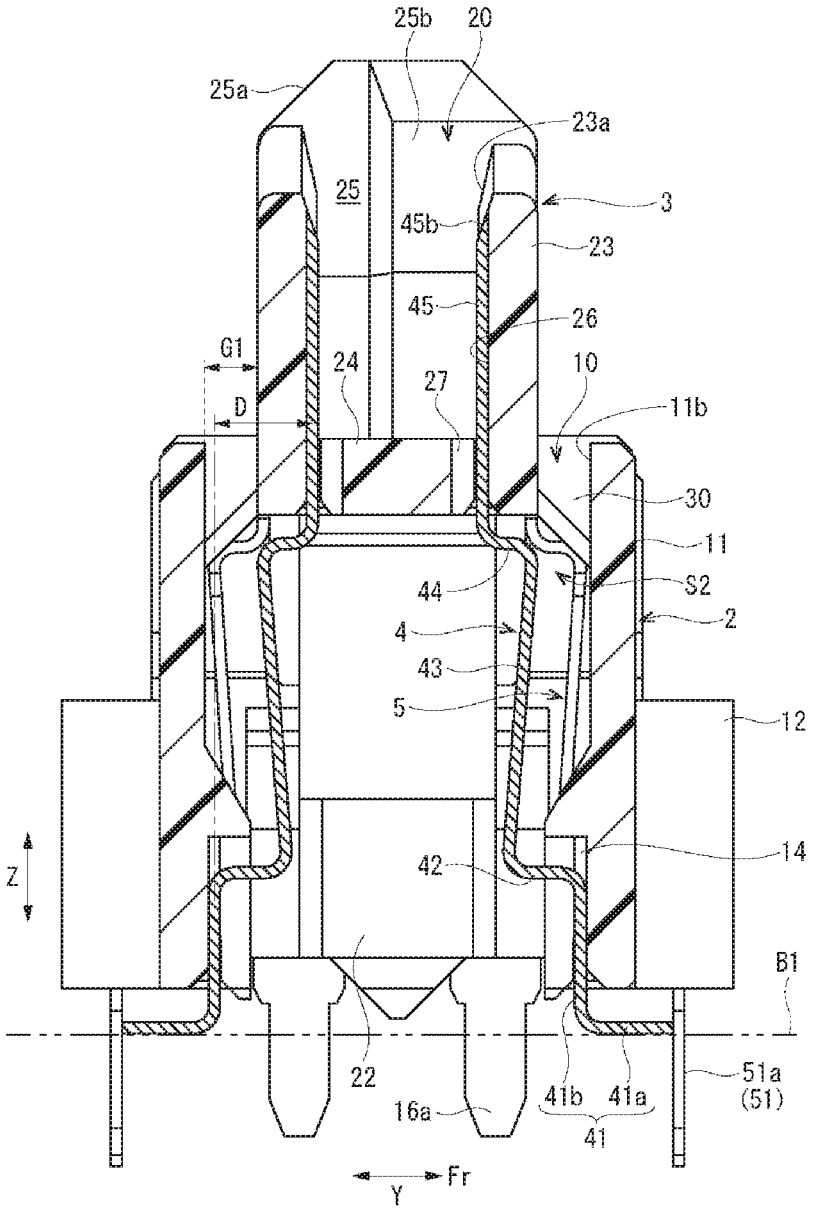


FIG. 4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45
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G1
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D
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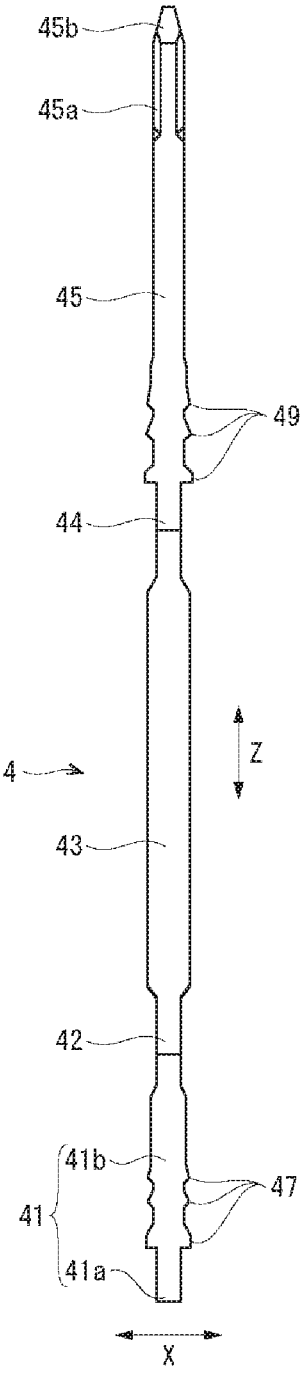
44
S2
4
2
43
5
12
Z
42
14
B1
22
51a
(51)
16a
41b
41a
41
Y
Fr

FIG. 5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42
41b
47
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41a
X

FIG. 6 (a)

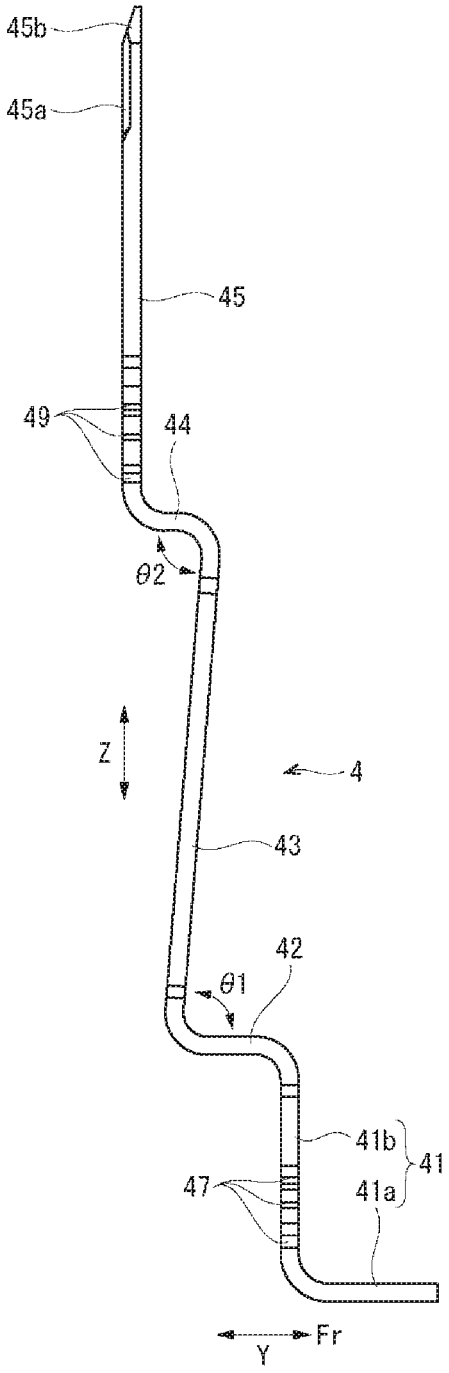
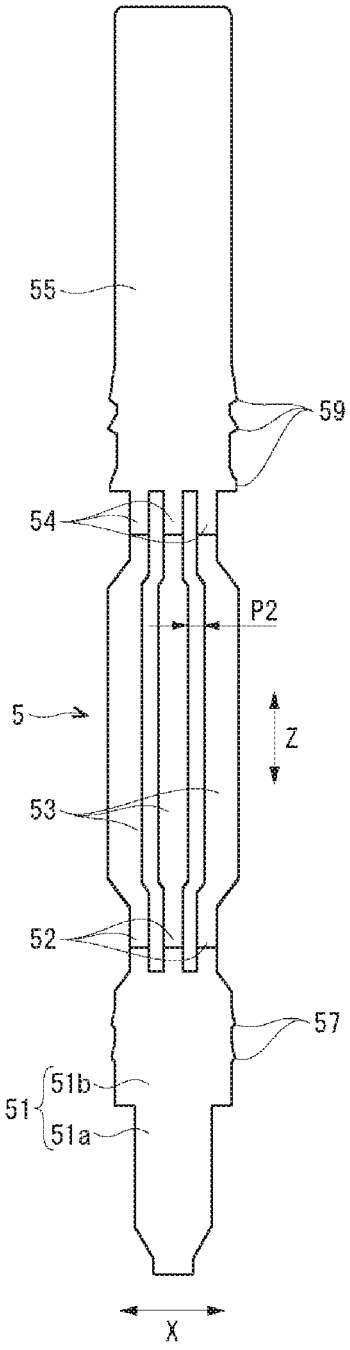

45b
45a
45
49
44
θ2
Z
4
43
42
θ1
41b
41
47
41a
Fr
Y

FIG. 6 (b)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59
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P2
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Z
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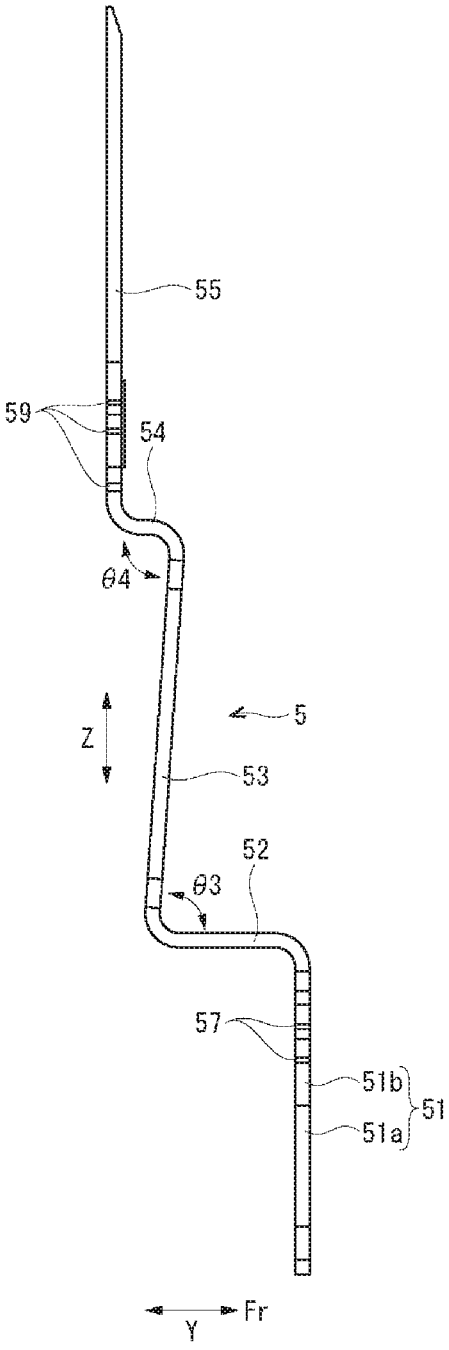
52
57
51
51b
51a
X

FIG. 7 (a)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θ4
Z
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53
52
θ3
57
51b
51a
51
Y
Fr

FIG. 7 (b)

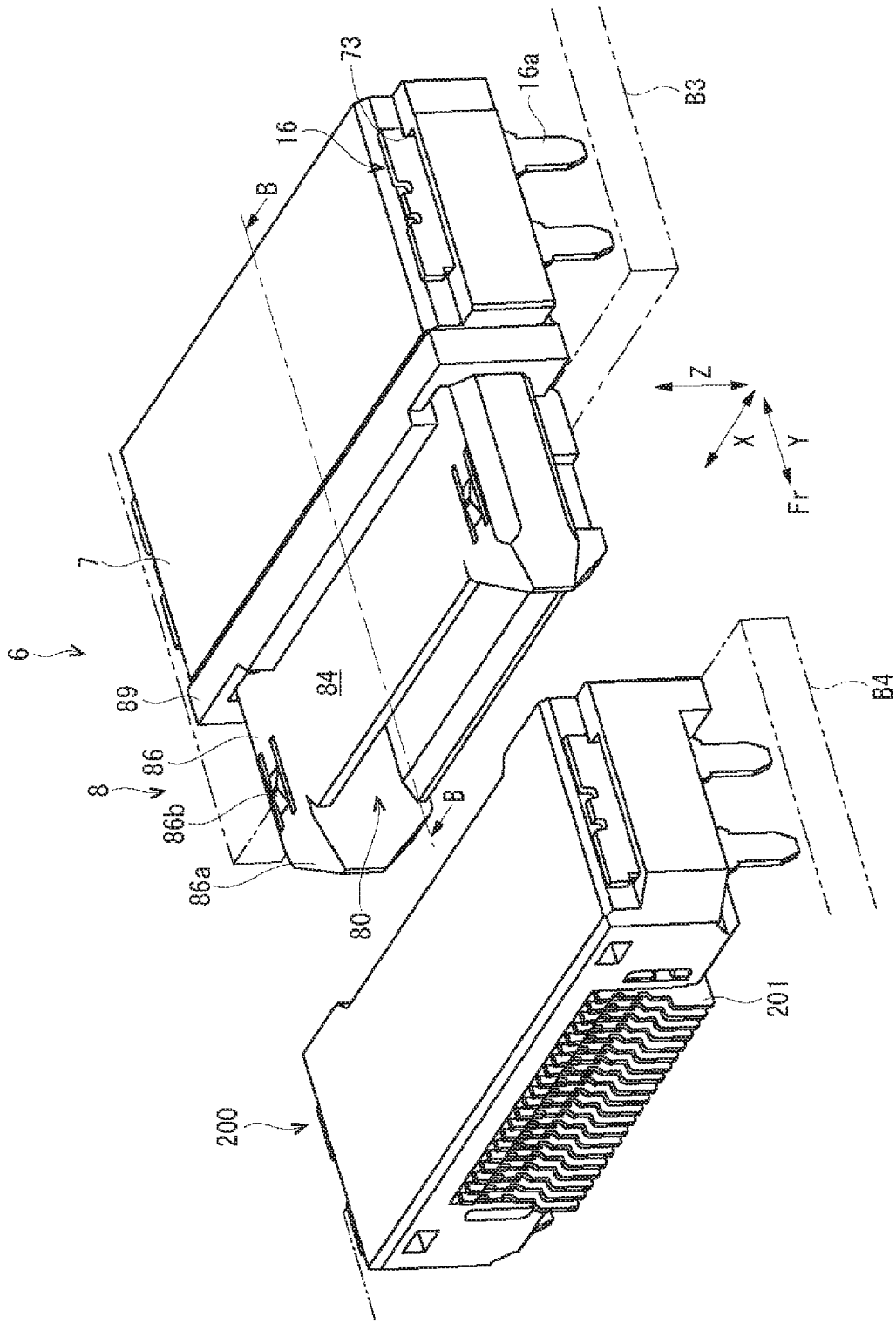
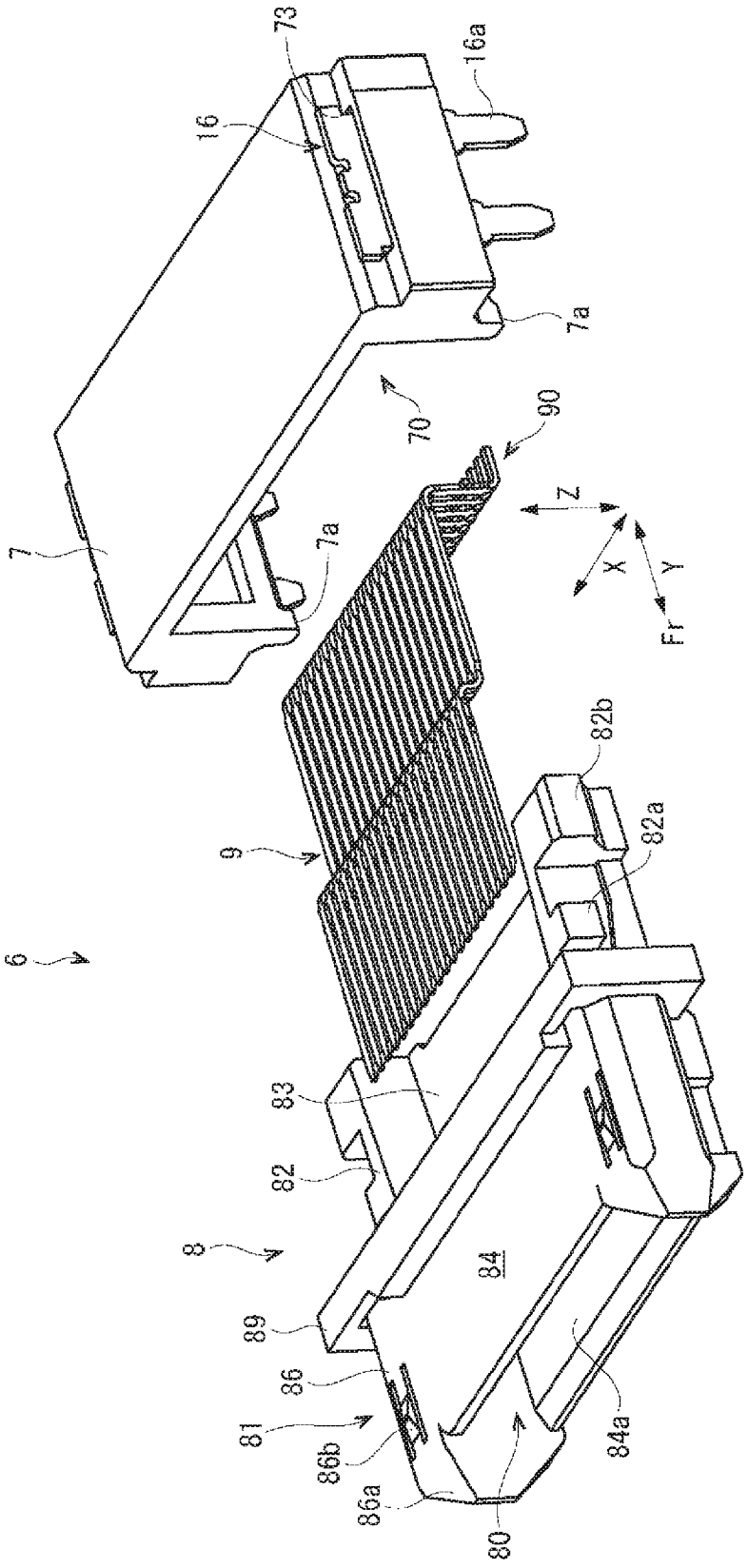


FIG. 8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16a
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90
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X
Y
Fr
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82a
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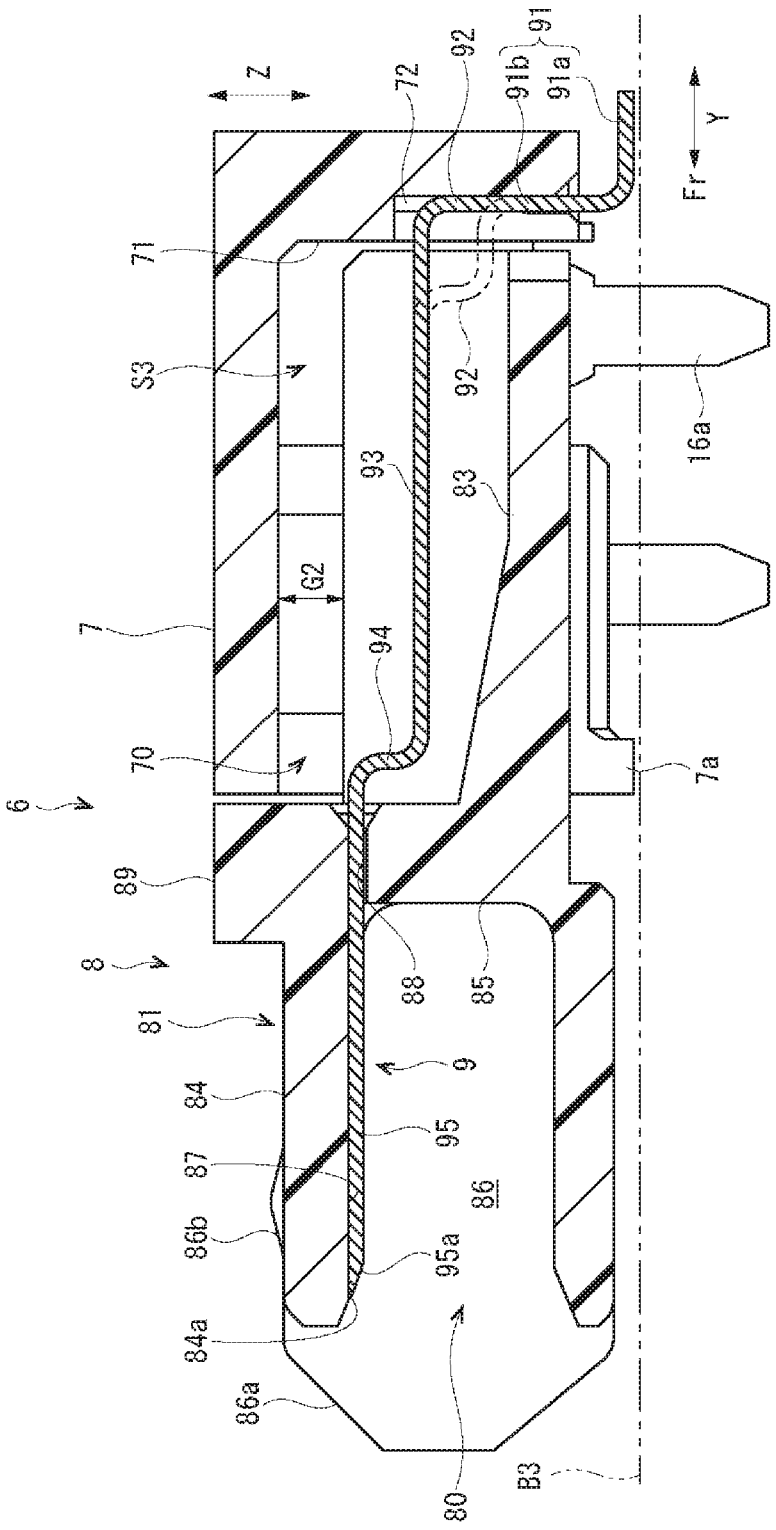
8
84
89
86
81
86b
86a
80
84a

FIG. 9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S3
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16a
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70
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86b
95a
84a
86a
80
B3

FIG. 10

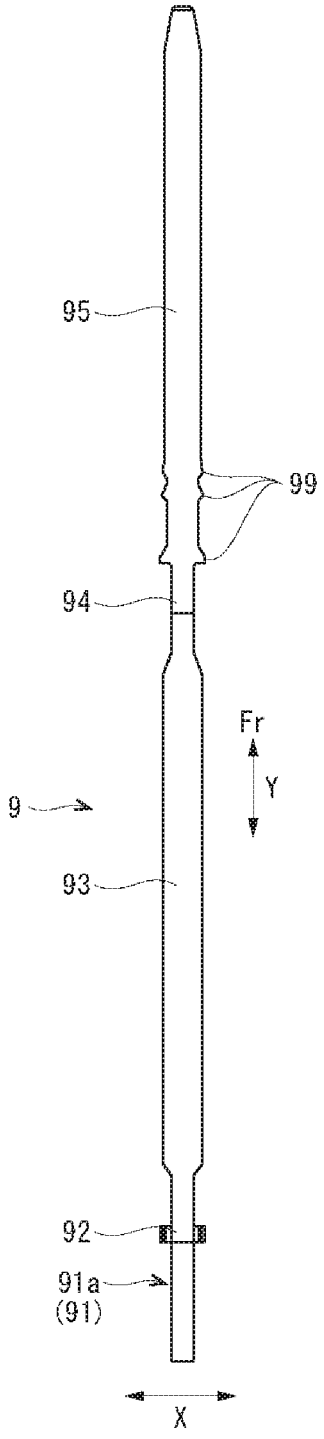

FIG. 11 (a)

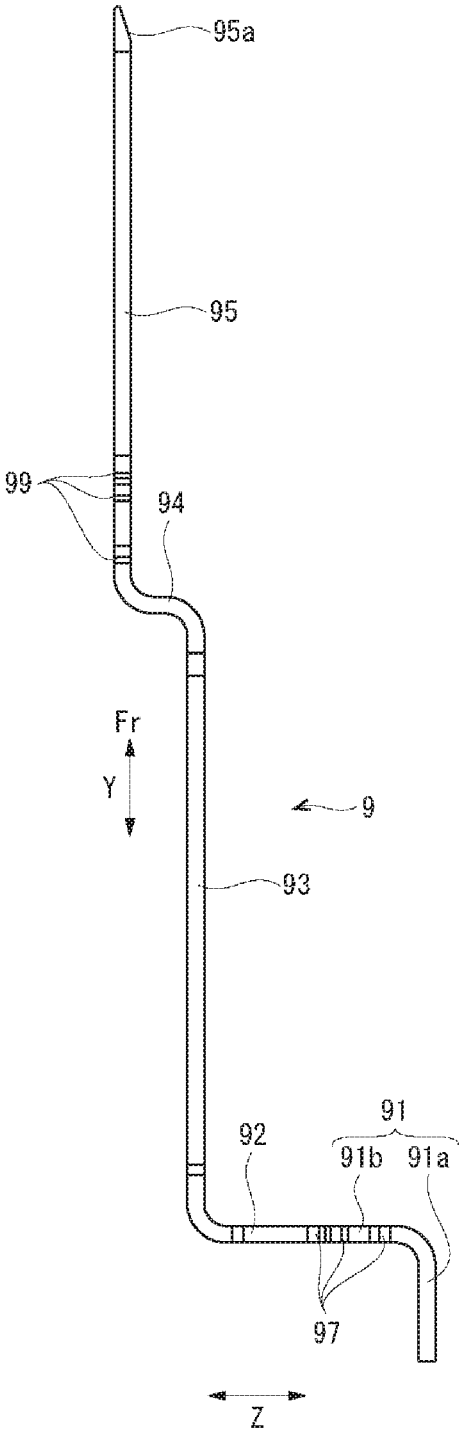

FIG. 11 (b)

ELECTRICAL CONNECTOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation application of a prior application Ser. No. 14/452,564, filed Aug. 6, 2014, allowed, which claims foreign priority of Japanese patent application JP 2013-166099, filed on Aug. 9, 2013.

BACKGROUND OF THE INVENTION AND RELATED ART STATEMENT

The present invention relates to an electrical connector for electrically connecting a pair of circuit boards.

A conventional electrical connector is to be fixed to one circuit board, and is configured to engage with a mating side connector fixed to another circuit board, so that a pair of circuit boards is electrically connected.

For example, Patent Reference has disclosed such a conventional electrical connector. In the conventional electrical connector disclosed in Patent Reference includes a plurality of conductive contact members (terminals) arranged with a constant interval; a fixed housing for holding one edge portion of each of the conductive contact members; and a movable housing for holding the other edge portion of each of the conductive contact members and to be connected to a mating side connector. Further, each of the conductive contact members has a slit extending from the one edge portion to the other edge portion. In the conventional electrical connector disclosed in Patent Reference, each of the conductive contact members is divided with the slit, so that the conductive contact members is capable of elastically deforming. Accordingly, the movable housing is supported to be movable relative to the fixed housing.

Patent Reference: Japanese Patent Application Publication No. 2008-084756

In the conventional electrical connector disclosed in Patent reference, each of the conductive contact members has an exposed portion (a portion that directly contacts with air) exposed from the fixed housing and the movable housing and a held portion held with the fixed housing or the movable housing. As opposed to the held portion, the exposed portion tends to have a large impedance level. As a result, an impedance imbalance may be generated in each of the conductive contact members. When the exposed portion of each of the conductive contact members is enlarged (thereby increasing a sectional area thereof), it is possible to minimize the impedance imbalance. However, when the exposed portion of each of the conductive contact members is enlarged, it may be difficult for the conductive contact members to elastically deform. As a result, it may be difficult for the movable housing to smoothly move.

In the conventional electrical connector disclosed in Patent Reference, each of the conductive contact members (the terminals) is divided with the slit, so that the conductive contact members is capable of elastically and smoothly deforming. However, depending on a thickness (a width) of the conductive contact members, even if each of the conductive contact members (the terminals) is divided with the slit, it still may be difficult for the conductive contact members to elastically deform. As a result, it may be difficult for the movable housing to smoothly move relative to the fixed housing.

In view of the problems described above, an object of the present invention is to provide an electrical connector capable of solving the problems. In the present invention, the electrical connector includes a movable housing capable of smoothly moving.

Further objects and advantages of the present invention will be apparent from the following description of the present invention.

SUMMARY OF THE PRESENT INVENTION

According to a first aspect of the present invention, an electrical connector includes a fixed housing to be fixed to a board; a movable housing arranged to be movable relative to the fixed housing; and a plurality of terminals disposed between the fixed housing and the movable housing. Further, the terminals are arranged with a specific interval in between.

According to the first aspect of the present invention, each of the terminals includes a connecting portion held with the fixed housing and to be fixed to the board; a first elastic portion connected to the connecting portion and capable of elastically deforming; a terminal portion held with the movable housing and to be electrically connected to a mating side connector; a second elastic portion connected to the terminal portion and capable of elastically deforming; and a wide width portion connected between the first elastic portion and the second elastic portion so that the first elastic portion is curved in a direction opposite to a direction that the second elastic portion is curved. Further, the wide width portion has a width greater than that of the first elastic portion and the second elastic portion.

According to the first aspect of the present invention, in the electrical connector, the wide width portion is situated between the first elastic portion and the second elastic portion, so that the wide width portion becomes an exposed portion (a portion contacting with air) not being held with the fixed housing and the movable housing. Further, the wide width portion has a width greater than that of the first elastic portion and the second elastic portion. The first elastic portion and the second elastic portion are curved relative to the wide width portion, and have a width smaller than that of the wide width portion. Accordingly, the first elastic portion and the second elastic portion are capable of elastically deforming. As a result, the movable housing can be smoothly moving relative to the fixed housing.

According to the first aspect of the present invention, in the electrical connector, the wide width portion has a sectional area greater than that of the first elastic portion and the second elastic portion. Further, the wide width portion is away from the wide width portion at an adjacent position by a distance smaller than that of the first elastic portion and the second elastic portion. Accordingly, it is possible to make impedance compatible at least within each of the terminals and between a pair of the terminals. As a result, it is possible to prevent a high frequency signal from being disturbed due to incompatible impedance, thereby making it possible to smoothly perform high speed communication of the high frequency signal. In particular, it is effective in using a differential transmission method.

According to a second aspect of the present invention, an electrical connector includes a fixed housing to be fixed to a board; a movable housing arranged to be movable relative to the fixed housing; and a plurality of terminals disposed between the fixed housing and the movable housing.

According to the second aspect of the present invention, each of the terminals includes a connecting portion held with the fixed housing and to be fixed to the board; a plurality of first elastic portions connected to the connecting portion in

an arrange state with a specific interval in between and capable of elastically deforming; a terminal portion held with the movable housing and to be electrically connected to a mating side connector; a plurality of second elastic portions connected to the terminal portion in an arrange state with a specific interval in between and capable of elastically deforming; and a plurality of wide width portions connected between the first elastic portions and the second elastic portions so that the first elastic portions are curved in a direction opposite to a direction that the second elastic portions are curved. Further, the wide width portions have a width greater than that of the first elastic portions and the second elastic portions.

According to the second aspect of the present invention, in the electrical connector, the wide width portions are situated between the first elastic portions and the second elastic portions, so that the wide width portions become an exposed portion (a portion contacting with air) not being held with the fixed housing and the movable housing. Further, the wide width portions have a width greater than that of the first elastic portions and the second elastic portions. The first elastic portions and the second elastic portions are curved relative to the wide width portions, and have a width smaller than that of the wide width portion. Accordingly, the first elastic portions and the second elastic portions are capable of elastically deforming. As a result, the movable housing can be smoothly moving relative to the fixed housing.

According to the second aspect of the present invention, in the electrical connector, the first elastic portions are connected with the connecting portions, and the second elastic portions are connected with the terminal portions. Further, the wide width portions have a width greater than that of the first elastic portions and the second elastic portions. Accordingly, it is possible to flow a large amount of electrical current through the terminals (for example, a power source terminal).

According to of a third aspect the present invention, in the electrical connector in the first aspect or the second aspect, the wide width portion may be preferably inclined by an acute angle relative to the first elastic portion and the second elastic portion. Further, the wide width portion may preferably extend toward a connection direction with the mating side connector.

According to of the third aspect the present invention, the first elastic portion and the second elastic portion are curved relative to the wide width portion in the opposite directions. Further, the wide width portion is inclined by an acute angle relative to the first elastic portion and the second elastic portion. In other words, the wide width portion, the first elastic portion, and the second elastic portion are arranged in a substantially Z character shape. Accordingly, it is possible to minimize a space (a shift) between an extension line from a position where the connecting portion is held with the fixed housing toward the connecting direction of the mating side connector and a position where the connecting portion is held with the movable housing. When such an offset amount is minimized, it is possible to prevent the first elastic portion and the second elastic portion from being excessively deformed when the movable housing is moved. As a result, it is possible to smoothly move the movable housing relative to the fixed housing, and smoothly deform the first elastic portion and the second elastic portion in the deformation direction.

According to of a fourth aspect the present invention, in the electrical connector in the third aspect, the fixed housing may preferably include a fixed side opening portion for accommodating the movable housing, so that the movable housing is retained in the fixed side opening portion with a specific space between an outer side surface of the movable housing and the fixed housing. Further, the movable housing may preferably include a movable side opening portion situated above the fixed housing for inserting the mating side connector from above.

According to the fourth aspect of the present invention, the connecting portion may preferably extend upwardly from the board, and may be preferably fitted in a fixed side pressing groove formed in a fixed side inner wall surface constituting the fixed side opening portion. The first elastic portion may preferably extend toward inside from an upper edge portion of the connecting portion. The wide width portion may be preferably inclined toward outside from an inner edge portion of the first elastic portion, and may preferably extend upwardly. The second elastic portion may preferably extend toward inside from an upper edge portion of the wide width portion. The terminal portion may preferably extend upwardly from an inner edge portion of the second elastic portion, and may be preferably fitted in a movable side pressing groove formed in a movable side inner wall surface constituting the movable side opening portion or a movable side outer wall surface of the movable housing.

According to the fourth aspect of the present invention, the wide width portion, the first elastic portion, and the second elastic portion are arranged in a substantially Z character shape. Accordingly, it is possible to minimize a space (a shift) between an extension line from a position where the connecting portion is held with the fixed housing toward the vertical upside and a position where the connecting portion is held with the movable housing. As a result, it is possible to smoothly move the movable housing relative to the fixed housing in a direction connecting the inside and the outside.

According to of a fifth aspect the present invention, in the electrical connector in the third aspect, the fixed housing may preferably include a fixed side opening portion for accommodating the movable housing, so that the movable housing is retained in the fixed side opening portion with a specific space between an outer side surface of the movable housing and the fixed housing. Further, the movable housing may preferably include a movable side opening portion situated on one side of the fixed housing in parallel to the board for inserting the mating side connector from one side.

According to the fifth aspect of the present invention, the connecting portion may preferably extend upwardly from the board, and may be preferably fitted in a fixed side pressing groove formed in a fixed side inner wall surface constituting the fixed side opening portion. The first elastic portion may preferably extend upwardly from an upper edge portion of the connecting portion. The wide width portion may be preferably inclined downwardly from an upper edge portion of the first elastic portion, and may preferably extend one side. The second elastic portion may preferably extend upwardly from one side edge portion of the wide width portion. The terminal portion may be preferably extend one side from an inner edge portion of the second elastic portion, and may be preferably fitted in a movable side pressing groove formed in a movable side inner wall surface constituting the movable side opening portion.

According to the fifth aspect of the present invention, the wide width portion, the first elastic portion, and the second elastic portion are arranged in a substantially Z character shape. Accordingly, it is possible to minimize a space (a shift) between an extension line extending horizontally from

a position where the connecting portion is held with the fixed housing toward the connecting direction of the mating side connector and a position where the connecting portion is held with the movable housing. As a result, it is possible to smoothly move the movable housing relative to the fixed housing in a direction connecting the inside and the outside.

According to the present invention, in the electrical connector, it is possible to smoothly move the movable housing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective views showing an electrical connector and a mating side connector according to a first embodiment of the present invention;

FIG. **2** is an exploded perspective view showing the electrical connector according to the first embodiment of the present invention;

FIG. **3** is a front view showing the electrical connector according to the first embodiment of the present invention;

FIG. **4** is a side view showing the electrical connector according to the first embodiment of the present invention;

FIG. **5** is a sectional view showing the electrical connector taken along a line A-A in FIG. **3** according to the first embodiment of the present invention;

FIGS. **6**(*a*) and **6**(*b*) are views showing a connection terminal of the electrical connector according to the first embodiment of the present invention, wherein FIG. **6**(*a*) is a front view showing the connection terminal, and FIG. **6**(*b*) is a side view showing the connection terminal;

FIGS. **7**(*a*) and **7**(*b*) are views showing a power source terminal of the electrical connector according to the first embodiment of the present invention, wherein FIG. **7**(*a*) is a front view showing the power source terminal, and FIG. **7**(*b*) is a side view showing the power source terminal;

FIG. **8** is a perspective views showing an electrical connector and a mating side connector according to a second embodiment of the present invention;

FIG. **9** is an exploded perspective view showing the electrical connector according to the second embodiment of the present invention;

FIG. **10** is a sectional view showing the electrical connector taken along a line B-B in FIG. **8** according to the second embodiment of the present invention; and

FIGS. **11**(*a*) and **11**(*b*) are views showing a connection terminal of the electrical connector according to the second embodiment of the present invention, wherein FIG. **11**(*a*) is a plan view showing the connection terminal, and FIG. **11**(*b*) is a side view showing the connection terminal.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereunder, embodiments of the present invention will be described with reference to the accompanying drawings. It should be noted that, in the accompanying drawings, a front direction is represented with Fr; a right-left direction is represented with X; a front-rear direction is represented with Y; and an up-down direction is represented with Z.

First Embodiment

A first embodiment will be explained with reference to FIGS. **1** to **5**. FIG. **1** is a perspective views showing an electrical connector **1** and a mating side connector **100** according to the first embodiment of the present invention. FIG. **2** is an exploded perspective view showing the electrical connector **1** according to the first embodiment of the present invention. FIG. **3** is a front view showing the electrical connector **1** according to the first embodiment of the present invention. FIG. **4** is a side view showing the electrical connector **1** according to the first embodiment of the present invention. FIG. **5** is a sectional view showing the electrical connector **1** taken along a line A-A in FIG. **3** according to the first embodiment of the present invention.

As shown in FIG. **1**, the electrical connector **1** is a so-called floating connector, and is a plug (a meal type) to be attached to a board B**1**. The mating side connector **100** as a receptacle (a female type) is attached to a mating side board B**2**. When the electrical connector **1** is connected to the mating side connector **100**, a pair of the board B**1** and the mating side board B**2** is electrically connected.

As shown in FIGS. **1** and **2**, the electrical connector **1** includes a fixed housing **2** to be fixed to the board B**1**; a movable housing **3** arranged to be movable relative to the fixed housing **2**; a plurality of connection terminals **4** disposed between the fixed housing **2** and the movable housing **3** and arranged with a specific interval; and a plurality of power source terminals **5** disposed between the fixed housing **2** and the movable housing **3** similarly to the connection terminals **4**.

As shown in FIGS. **1** to **3**, the fixed housing **2** includes a fixed side opening portion **10** penetrating in the up-down direction, and is formed in a substantially cylindrical shape. The fixed side opening portion **10** is formed such that the movable housing **3** can be retained in the fixed side opening portion **10** with a specific space G1 relative to an outer side surface of the movable housing **3**.

In the first embodiment, the fixed housing **2** is integrally formed of an insulation material such as a synthetic resin and the like. Further, the fixed housing **2** includes a pair of fixed main body wall portions **11** arranged in the front-rear direction with the fixed side opening portion **10** in between; two pairs of extending wall portions **12** extending toward outside in the left-right direction from right and left edge portions of the fixed main body wall portions **11**; and a pair of board fixing portions **13** arranged in the front-rear direction and connected to the extending wall portions **12** facing in the front-rear direction.

As shown in FIGS. **2** and **3**, each of the fixed main body wall portions **11** is formed in a substantially rectangular shape elongating in the up-down direction in a front view thereof. Further, each of the fixed main body wall portions **11** includes an upper inclined surface **11***a* at both corners on an upper left side and an upper right side thereof such that the upper included surface **11***a* is formed as an obliquely cut corner. Further, each of the fixed main body wall portions **11** includes a smooth outer side surface and a fixed side inner surface **11***b*. The fixed side inner surface **11***b* as an inner side surface of each of the fixed main body wall portions **11** constitutes a part of the fixed side opening portion **10**, and includes a protruding portion protruding inside at a lower portion thereof. In other words, each of the fixed main body wall portions **11** has the lower portion having a thickness greater than the upper portion thereof.

In the first embodiment, a plurality of fixed side pressing grooves **14** is formed in the lower portion (the thick portion) of the fixed side inner surface **11***b* of each of the fixed main body wall portions **11** such that the fixed side pressing grooves **14** extend upwardly from a lower edge (refer to FIG. **2**). Each of the fixed side pressing grooves **14** is formed in a shape such that each of the fixed side pressing grooves **14** has a C character shaped sectional surface in a plan view.

In the first embodiment, each of the extending wall portions **12** is connected to a substantially lower half of each

of the fixed main body wall portions **11** in a front view, and includes a lower edge surface formed to be flash with a lower edge surface of each of the fixed main body wall portions **11**. Further, each of the extending wall portions **12** includes an inclined portion **12***a* and a parallel portion **12***b*. The inclined portion **12***a* is inclined toward outside in the left-right direction at the connecting portion thereof to the fixed main body wall portion **11** in the plan view. The parallel portion **12***b* extends from an outer edge portion of the inclined portion **12***a* toward outside in the left-right direction.

In the first embodiment, a power source fixed side pressing groove **15** is formed as a recessed portion in an inner side surface of each of the extending wall portions **12** at a lower portion thereof (refer to FIG. **3**), that is, a lower portion of a fixed side inner wall surface **12***c* (refer to FIG. **2**) constituting a part of the fixed side opening portion **10**. The power source fixed side pressing groove **15** extends upward from a lower edge portion of each of the extending wall portions **12**. Further, the power source fixed side pressing groove **15** has a substantially C character shaped sectional surface in the plan view, and has a height (a length) substantially the same as each of the fixed side pressing grooves **14**. Further, the power source fixed side pressing groove **15** is formed to have a width in the left-right direction greater than that of each of the fixed side pressing grooves **14**.

In the first embodiment, each of the board fixing portions **13** includes a lateral protruding strip portion **13***a* and a vertical protruding strip portion **13***b* on an inner side surface thereof in the left-right direction. The lateral protruding strip portion **13***a* extends in the front-rear direction at a center portion of each of the board fixing portions **13** in the up-down direction. The vertical protruding strip portion **13***b* extends upwardly from an upper side of the lateral protruding strip portion **13***a* at a center portion of each of the board fixing portions **13** in the front-rear direction. Both the lateral protruding strip portion **13***a* and the vertical protruding strip portion **13***b* have a substantially trapezoid shaped sectional surface. Further, an engaging space S1 having a substantially cubic shape is formed below the lateral protruding strip portion **13***a*.

In the first embodiment, each of the board fixing portions **13** further includes a lower portion of an outer side surface in the left-right direction that is protruding outside stepwise. A metal member fixing hole **13***c* is formed to penetrate the lower portion of each of the board fixing portions **13**, and the metal member fixing hole **13***c* has a substantially rectangular shape in the plan view. A fixing metal member **16** (refer to FIG. **1**) is tightly fitted into the metal member fixing hole **13***c*. A rectangular groove **13***d* is formed above the metal member fixing hole **13***c*. The rectangular groove **13***d* has a substantially rectangular shape and extends from outside toward inside in the left-right direction.

In the first embodiment, the fixing metal member **16** includes a pair of metal member leg portions **16***a* arranged in the front-rear direction at a lower portion thereof, so that the fixing metal member **16** is formed in a substantially U character shape. When the fixing metal member **16** is tightly fitted into the metal member fixing hole **13***c*, the metal member leg portions **16***a* extend downwardly from a lower edge surface of each of the board fixing portions **13** (refer to FIG. **3**). Further, the metal member leg portions **16***a* penetrate through a through hole (not shown) formed in the board B**1**, so that the metal member leg portions **16***a* are fixed to the board B**1** with solder and the like.

As shown in FIGS. **1** to **4**, the movable housing **3** is integrally formed with an insulation material such as a synthetic resin and the like. Further, the movable housing **3** includes a movable main body portion **21** and a pair of movable leg portions **22** arranged in the front-rear direction. The movable main body portion **21** includes a movable side opening portion **20** opening upwardly, and is formed in a substantially rectangular cylindrical shape. The movable leg portions **22** are formed to extend downwardly from both left and right edge portions of the movable main body portion **21** in the left-right direction. With the movable main body portion **21** and the movable leg portions **22**, the movable housing **3** is formed in a substantially inverted U character shape in the front view.

In the first embodiment, the movable side opening portion **20** is formed in a substantially cubic shape elongating in the left-right direction in the plan view. Further, the movable side opening portion **20** is arranged to accommodate a plurality of mating side terminals **101**.

In the first embodiment, the movable main body portion **21** includes a pair of movable main body wall portions **23** arranged in the front-rear direction with the movable side opening portion **20** in between; a movable bottom portion **24** (refer to FIG. **5**) arranged to connect lower portions of the movable main body wall portions **23** facing in the front-rear direction; and a pair of movable column portions **25** arranged in the front-rear direction and formed to support left and right outer edge portions of the movable main body wall portions **23** and the movable bottom portion **24**.

As shown in FIGS. **2** and **3**, each of the movable main body wall portions **23** is formed in a substantially rectangular shape elongating in the left-right direction in the front view. A plurality of movable side pressing grooves **26** is formed as a recess portion in an inner side surface of each of the movable main body wall portions **23**, that is, a movable side inner wall surface **23***a* of each of the movable main body wall portions **23** constituting a part of the movable side opening portion **20**. Each of the movable side pressing grooves **26** is formed to extend in the up-down direction, and is situated at a location corresponding to each of the fixed side pressing grooves **14**, respectively. Further, each of the movable side pressing grooves **26** is formed in a groove shape having a substantially U character shape in the plan view, and is formed to extend from a lower edge portion to near an upper edge portion of each of the movable main body wall portions **23**. It should be noted that an inclined surface expanding upwardly is formed at the upper edge portion of each of the movable side inner wall surfaces **23***a*.

As shown in FIG. **5**, the movable bottom portion **24** is formed in a substantially cubic shape elongating in the left-right direction, so that the movable bottom portion **24** constitutes a bottom surface of the movable side opening portion **20**. Further, the movable bottom portion **24** has a lower edge surface formed to be flash with a lower edge surface of each of the movable main body wall portions **23**. A plurality of terminal through holes **27** penetrating in the up-down direction is formed in the movable bottom portion **24** at locations corresponding to each of the movable side pressing grooves **26**. More specifically, each of the terminal through holes **27** is disposed along the movable side inner wall surfaces **23***a* paired in the front-rear direction, and is arranged in two rows so that the terminal through holes **27** become linear symmetry in the front-rear direction. It should be noted that the movable side pressing grooves **26** are formed in each of the terminal through holes **27**.

As shown in FIGS. **2** and **3**, each of the movable column portions **25** is formed in a substantially rectangular column shape. An engaging guide portion **25***a* is formed at an upper

edge portion of each of the movable column portions **25**, and four corners of the engaging guide portion **25***a* at a front portion, a rear portion, a left portion, and a right portion thereof are chamfered. Each of the engaging guide portions **25***a* is situated at an upper location relative to an upper edge surface of each of the movable main body wall portions **23**. Further, a guide inclined surface **25***b* is formed on each of the movable column portions **25** on the side of the movable side opening portion **20** thereof, and the guide inclined surface **25***b* is inclined downwardly from a lower side of the engaging guide portion **25***a* toward inside in the left-right direction. Further, a guide groove **25***c* is formed as a recessed portion in an outer side surface of each of the movable column portions **25** in the left-right direction, and the guide groove **25***c* is formed to extend downwardly from the lower side of the engaging guide portion **25***a*.

In the first embodiment, a power source movable side pressing groove **28** is formed as a recessed portion in both side surfaces (a movable side outer wall surface) of each of the movable column portions **25** in the front-rear direction, and the power source movable side pressing groove **28** extends in the up-down direction. Further, the power source movable side pressing groove **28** is situated at a location corresponding to each of the power source fixed side pressing grooves **15**. Further, the power source movable side pressing groove **28** is formed as a groove having a substantially U character shape sectional shape in the plan view, and extends from a lower edge of each of the movable column portions **25** to a lower edge of each of the engaging guide portions **25***a*. Further, the power source movable side pressing groove **28** is formed to have a width in the left-right direction greater than that of each of the movable side pressing grooves **26**.

As shown in FIGS. **2** and **3**, each of the movable leg portions **22** is integrally formed to extend downwardly from the lower edge of each of the movable column portions **25**. Further, each of the movable leg portions **22** is formed to have a width increasing toward upward inside in the left-right direction from a location near the lower portion thereof in the up-down direction in the front view.

In the first embodiment, two pairs of movement regulating blocks **30** are disposed at an upper portion of each of the movable leg portions **22**. The movement regulating blocks **30** are paired in the left-right direction, and protrude from both side surfaces of each of the movable leg portions **22** in the front-rear direction. The movement regulating blocks **30** paired in the left-right direction and disposed on the front side are formed to extend around from the front side surface to the outer side surface in the left-right direction between each of the movable leg portions **22** and each of the movable column portions **25**.

In the first embodiment, each of the movement regulating blocks **30** paired in the left-right direction and disposed on the front side includes an outer inclined surface **30***a* inclined toward the outer surfaces of each of the movable leg portions **22** and each of the movable column portions **25** in the left-right direction. Further, each of the movement regulating blocks **30** paired in the left-right direction and disposed on the front side includes an inner inclined surface **30***b* inclined toward the front side surface of each of the movable main body wall portions **23**. A lower inclined surface **30***c* is formed below each of the inner inclined surfaces **30***b* paired in the left-right direction and disposed on the front side, and is inclined downwardly toward outside in the left-right direction. It should be noted that each of the movement regulating blocks **30** paired in the left-right direction and disposed on the rear side includes the outer inclined surface **30***a*, the inner inclined surface **30***b*, and the lower inclined surface **30***c* at symmetrical locations in the front-rear direction.

In the first embodiment, a power source through hole **30***d* having a substantially rectangular shape is formed at the upper portion of each of the movement regulating blocks **30**, so that the power source through hole **30***d* communicates with each of the power source movable side pressing grooves **28**. Further, a movement space S2 (refer to FIG. **5**) is formed between a lower inner surface of each of the movement regulating blocks **30** and a surface of each of the movable leg portions **22**. It should be noted that each of the movable leg portions **22** paired in the left-right direction has a horizontally projected area having a shape slightly smaller and similar to that of the fixed side opening portion **10**.

As shown in FIG. **2**, an engaging block **31** having a substantially cubic shape is disposed at the lower portion of each of the movable leg portions **22**, and the engaging block **31** is formed to protrude from the outer side surface in the left-right direction. Each of the engaging blocks **31** paired in the left-right direction has a flat surface flash with each of both side surfaces of each of the movable leg portions **22** in the front-rear direction. Further, each of the engaging blocks **31** has an upper portion protruding outside further than a lower portion thereof in the front view.

As shown in FIGS. **1** and **2**, a plurality of the connection terminals **4** constitutes terminal rows **40** arranged with an equal interval in between in the left-right direction. In the electrical connector **1**, two of the terminal rows **40** are arranged to be symmetrical in the front-rear direction relative to each of the fixed housing **2** and the movable housing **3**.

In the first embodiment, each of the connection terminals **4** has an identical configuration. Accordingly, in the following description, the configuration of one of the connection terminals **4** will be explained with reference to FIGS. **5** and **6**(*a*)-**6**(*b*). FIGS. **6**(*a*) and **6**(*b*) are views showing the connection terminal **4** of the electrical connector **1** according to the first embodiment of the present invention. More specifically, FIG. **6**(*a*) is a front view showing the connection terminal **4**, and FIG. **6**(*b*) is a side view showing the connection terminal **4**. In the following description, otherwise specifically described, an outside (an outer edge) is defined as an outside of each of the fixed housing **2** and the movable housing **3** in the front-rear direction, and an inside (an inner edge) is defined as a center side of each of the fixed side opening portion **10** and the movable side opening portion **20** in the front-rear direction.

As shown in FIGS. **5** and **6**(*a*)-**6**(*b*), the connection terminal **4** includes a connecting portion **41**; a first elastic portion **42**; a wide width portion **43**; a second elastic portion **44**; a terminal portion **45** integrally formed in this order upward from the side of the board B**1**. Further, the connection terminal **4** is formed through punching out a metal plate with conductivity into a thin strip shape, and bending the metal plate into a specific shape. Alternatively, the connection terminal **4** may be formed of a so-called punched out terminal obtained through punching out and processing into a specific shape.

In the first embodiment, the connecting portion **41** is arranged to be held with the fixed housing **2**, and be fixed to the board B**1**. Further, the connecting portion **41** includes a board mounting portion **41***a* to be electrically connected to the board B**1** with solder and the like, and a connection side pressing portion **41***b* extending upwardly from an inner edge portion (the board B**1**) of the board mounting portion **41***a*.

In the first embodiment, the board mounting portion **41***a* is formed to extend in parallel to the board B**1**. The connection side pressing portion **41***b* is formed to bend perpendicular to the board mounting portion **41***a*. Further, the connection side pressing portion **41***b* is arranged to be fitted into one of the fixed side pressing grooves **14** formed in the upper inclined surface **11***a* (refer to FIG. **5**). Three pairs of connection side pressing protrusions **47** paired in the left-right direction are disposed on both side surfaces of the connection side pressing portion **41***b*, and the connection side pressing protrusions **47** are arranged with a specific interval in the up-down direction. The connection side pressing portion **41***b* has a length in the up-down direction substantially the same as that of each of the fixed side pressing grooves **14** in the up-down direction. When the connection side pressing portion **41***b* is fitted into one of the fixed side pressing grooves **14**, an outer edge portion of the board mounting portion **41***a* is exposed outside from the fixed housing **2**.

In the first embodiment, the first elastic portion **42** is connected to the connecting portion **41**, and is configured to be capable of elastically deforming. Further, the first elastic portion **42** is formed to bend perpendicular to the connection side pressing portion **41***b*. Further, the first elastic portion **42** is arranged to extend inwardly from an upper edge portion of the connection side pressing portion **41***b* (the connecting portion **41**), and substantially in parallel to the board B**1**. Further, the first elastic portion **42** has a length in the front-rear direction slightly greater than a thickness of each of the fixed main body wall portions **11**.

In the first embodiment, the wide width portion **43** is formed to extend upwardly from an inner edge portion of the first elastic portion **42** and be inclined outwardly, so that an angle θ1 between the wide width portion **43** and the first elastic portion **42** becomes an acute angle (less than 90°). Further, the wide width portion **43** has a length in the up-down direction substantially the same as a height of each of the movable main body wall portions **23**.

In the first embodiment, the second elastic portion **44** is connected to the terminal portion **45**, and is configured to be capable of elastically deforming. Further, the second elastic portion **44** is formed to extend inside from an inner edge portion of the wide width portion **43**, and substantially in parallel to the board B**1**. Further, the wide width portion **43** and the second elastic portion **44** are arranged such that an angle θ2 between the wide width portion **43** and the second elastic portion **44** becomes an acute angle (less than 90°). Further, the second elastic portion **44** has a length in the front-rear direction slightly smaller than that of the first elastic portion **42** in the front-rear direction.

Accordingly, in the first embodiment, the wide width portion **43** is disposed between the first elastic portion **42** and the second elastic portion **44** such that the first elastic portion **42** and the second elastic portion **44** are curved in opposite directions each other. Further, the wide width portion **43** is formed to extend in the up-down direction (the connecting direction relative to the mating side connector **100**) while the wide width portion **43** is inclined such that the angle θ1 between the wide width portion **43** and the first elastic portion **42** and the angle θ2 between the wide width portion **43** and the second elastic portion **44** become an acute angle (less than 90°). In other words, the first elastic portion **42**, the wide width portion **43**, and the second elastic portion **44** are arranged in a substantially Z character shape in the side view (refer to FIGS. **5** and **6**(*b*)). It should be noted that the first elastic portion **42**, the wide width portion **43**, and the second elastic portion **44** are arranged such that the angle θ1 becomes the same as the angle θ2 in the first embodiment.

In the first embodiment, the terminal portion **45** is configured to be held with the movable housing **3**, and to be electrically connected to the mating side connector **100**. Further, the terminal portion **45** is formed to be curved perpendicular to the second elastic portion **44**. Further, the terminal portion **45** is arranged to extend upwardly (upwardly in the vertical direction) from an inner edge portion of the second elastic portion **44**. Further, the terminal portion **45** is configured to be fitted into one of the movable side pressing grooves **26** formed in the movable side inner wall surface **23***a*.

In the first embodiment, three pairs of terminal side pressing protrusions **49** paired in the left-right direction are disposed on both side surfaces of the terminal portion **45**. A pair of chamfered portions **45***a* paired in the left-right direction is disposed inside at an upper edge portion of the terminal portion **45**. A tapered portion **45***b* is disposed above the chamfered portions **45***a* such that three sides except an outside of the tapered portion **45***b* are chamfered. Similar to the wide width portion **43**, the terminal portion **45** has a length in the up-down direction substantially the same as the height of each of the movable main body wall portions **23**.

In the first embodiment, each of the connecting portion **41**, the first elastic portion **42**, the wide width portion **43**, the second elastic portion **44**, and the terminal portion **45** constituting each of the connection terminals **4** has a length in the extension direction thereof that can be arbitrarily defined according to the length of each of the fixed side pressing grooves **14** and each of the movable side pressing grooves **26**, the thickness of the fixed housing **2** and the movable housing **3**, and the like.

As shown in FIG. **6**(*a*), in the connection terminal **4**, the first elastic portion **42** has a width in the left-right direction the same as that of the second elastic portion **44**, and the connecting portion **41** has a width in the left-right direction the same as that of the terminal portion **45**. Further, in the connection terminal **4**, each of the first elastic portion **42** and the second elastic portion **44** has the smallest width in the left-right direction, so that the first elastic portion **42** and the second elastic portion **44** are capable of elastically deforming. Further, each of the connecting portion **41** and the terminal portion **45** has the width in the left-right direction slightly greater than that of each of the first elastic portion **42** and the second elastic portion **44**. Further, the wide width portion **43** has the width in the left-right direction greater than that of each of the connecting portion **41** and the terminal portion **45**. Further, the wide width portion **43** has the width in the left-right direction greater than a distance P1 between the wide width portions **43** situated adjacent to each other (refer to FIG. **3**). It should be noted that the width of the connecting portion **41** in the left-right direction and the width of the terminal portion **45** in the left-right direction may be set arbitrarily, and may be set, for example, to be greater than that of the wide width portion **43**.

As shown in FIGS. **1** and **2**, the power source terminal **5** is disposed at each of four locations on both side surfaces of the movable housing **3** in the front-rear direction at both edge portions of the movable housing **3** in the left-right direction. The power source terminals **5** have an identical configuration. Accordingly, the configuration of one of the power source terminals will be explained with reference to FIGS. **7**(*a*) and **7**(*b*). FIGS. **7**(*a*) and **7**(*b*) are views showing the power source terminal **5** of the electrical connector **1** according to the first embodiment of the present invention. More specifically, FIG. **7**(*a*) is a front view showing the

power source terminal **5**, and FIG. **7**(*b*) is a side view showing the power source terminal **5**. It should be noted that explanations of portions of the power source terminals **5** similar to those of the connection terminal **4** are omitted.

As shown in FIGS. **7**(*a*) and **7**(*b*), the power source terminal **5** includes a power source side connecting portion **51**; first power source side elastic portions **52**; power source side wide width portions **53**; second power source side elastic portions **54**; a power source side terminal portion **55** integrally formed in this order upward from the side of the board B**1**. Further, the power source terminal **5** is formed through punching out a metal plate with conductivity into a thin strip shape, and bending the metal plate into a specific shape. Alternatively, the power source terminal **5** may be formed of a so-called punched out terminal obtained through punching out and processing into a specific shape.

In the first embodiment, the power source side connecting portion **51** is arranged to be held with the fixed housing **2**, and be fixed to the board B**1**. Further, the power source side connecting portion **51** includes a power source side board mounting portion **51***a* to be electrically connected to the board B**1** with solder and the like, and a power source side pressing portion **51***b* extending upwardly from an inner edge portion (the board B**1**) of the power source side board mounting portion **51***a*.

In the first embodiment, the power source side pressing portion **51***b* has a width in the left-right direction greater than that of the power source side board mounting portion **51***a*. Further, the power source side pressing portion **51***b* is arranged to be fitted into one of the power source fixed side pressing grooves **15** formed in the fixed side inner wall surface **12***c* (refer to FIG. **3**). Two pairs of power source side pressing protrusions **57** paired in the left-right direction are disposed on both side surfaces of the power source side pressing portion **51***b*, and the power source side pressing protrusions **57** are arranged with a specific interval in the up-down direction. The power source side board mounting portion **51***a* and the power source side pressing portion **51***b* have a length in the up-down direction substantially the same as that of each of the power source fixed side pressing grooves **15** in the up-down direction. When the power source side pressing portion **51***b* is fitted into one of the power source fixed side pressing grooves **15**, a lower edge portion of the power source side board mounting portion **51***a* is exposed below the fixed housing **2**.

In the first embodiment, the first power source side elastic portions **52** are arranged in parallel with an equal interval (a specific distance P2) in between in the left-right direction. Further, each of the first power source side elastic portions **52** is connected to each of the power source side wide width portions **53**, so that the first power source side elastic portions **52** are capable of elastically deforming. Further, the first power source side elastic portions **52** are formed to curve perpendicular to the power source side pressing portion **51***b*. Further, each of the first power source side elastic portions **52** is formed to extend inside from the upper edge portion of the power source side pressing portion **51***b* (the connecting portion) such that the first power source side elastic portions **52** extend substantially in parallel to the board B**1**. Each of the first power source side elastic portions **52** has a length in the front-rear direction substantially the same as a length of the power source side pressing portion **51***b* in the up-down direction.

In the first embodiment, the power source side wide width portions **53** are arranged in parallel with an equal interval (the specific distance P2) in between in the left-right direction. Further, each of the power source side wide width portions **53** is formed to extend upwardly from an inner edge portion of each of the first power source side elastic portions **52**, and is inclined outwardly, so that an angle θ3 between each of the power source side wide width portions **53** and each of the first power source side elastic portions **52** becomes an acute angle (less than 90°). Further, each of the power source side wide width portions **53** has a length in the up-down direction substantially the same as a length of the power source side connecting portion **51** in the up-down direction.

In the first embodiment, the second power source side elastic portions **54** are arranged in parallel with an equal interval (the specific distance P2) in between in the left-right direction. Further, each of the second power source side elastic portions **54** is connected to the power source side terminal portion **55**, so that the second power source side elastic portions **54** are capable of elastically deforming. Further, each of the power source side wide width portions **53** is formed to extend inwardly from an inner edge portion of each of the power source side wide width portions **53**, and substantially in parallel to the board B**1**, so that an angle θ4 between each of the power source side wide width portions **53** and each of the second power source side elastic portions **54** becomes an acute angle (less than 90°). Further, each of the second power source side elastic portions **54** has a length in the front-rear direction substantially the same as a thickness of each of the movable main body wall portions **23**.

Accordingly, in the first embodiment, the power source side wide width portions **53** are disposed between the first power source side elastic portions **52** and the second power source side elastic portions **54** such that the first power source side elastic portions **52** and the second power source side elastic portions **54** are curved in opposite directions each other. Further, the power source side wide width portions **53** are formed to extend in the up-down direction (the connecting direction relative to the mating side connector **100**) while the power source side wide width portions **53** are inclined such that the angle θ3 between the power source side wide width portions **53** and the first power source side elastic portions **52** and the angle θ4 between the power source side wide width portions **53** and the second power source side elastic portions **54** become an acute angle (less than 90°). In other words, the first power source side elastic portions **52**, the power source side wide width portions **53**, and the second power source side elastic portions **54** are arranged in a substantially Z character shape in the side view (refer to FIG. **7**(*b*)). It should be noted that the first power source side elastic portions **52**, the power source side wide width portions **53**, and the second power source side elastic portions **54** are arranged such that the angle θ3 becomes the same as the angle θ4 in the first embodiment.

In the first embodiment, the power source side terminal portion **55** is configured to be held with the movable housing **3**, and to be electrically connected to the mating side connector **100**. Further, the power source side terminal portion **55** is formed to be curved perpendicular to the second power source side elastic portions **54**. Further, the power source side terminal portion **55** is arranged to extend upwardly (upwardly in the vertical direction) from an inner edge portion of the second power source side elastic portions **54**. Further, the power source side terminal portion **55** is configured to be fitted into one of the power source movable side pressing grooves **28** formed in each of the movable column portions **25** (refer to FIG. **3**).

In the first embodiment, three pairs of power source terminal side pressing protrusions **59** paired in the left-right

direction are disposed on both side surfaces of the power source side terminal portion **55** at a lower portion thereof. Further, the power source side terminal portion **55** has a length in the up-down direction slightly greater than the height of each of the movable main body wall portions **23**.

In the first embodiment, each of the power source side connecting portion **51**, the first power source side elastic portions **52**, the power source side wide width portions **53**, the second power source side elastic portions **54**, and the power source side terminal portion **55** constituting the power source terminal **5** has a length in the extension direction thereof that can be arbitrarily defined according to the length of each of the power source fixed side pressing grooves **15** and each of the power source movable side pressing grooves **28**, the thickness of the fixed housing **2** and the movable housing **3**, and the like.

As shown in FIG. **7**(*a*), in the power source terminal **5**, each of the first power source side elastic portions **52** has a width in the left-right direction the same as that of each of the second power source side elastic portions **54**. Further, each of the first power source side elastic portions **52** and the second power source side elastic portions **54** has the smallest width in the left-right direction, so that the first power source side elastic portions **52** and the second power source side elastic portions **54** are capable of elastically deforming. Further, each of the power source side wide width portions **53** has an identical width in the left-right direction. Further, each of the power source side wide width portions **53** has the width in the left-right direction greater than that of each of the first power source side elastic portions **52** and the second power source side elastic portions **54**. Further, each of the power source side wide width portions **53** has the width in the left-right direction greater than the distance P2.

In the first embodiment, the power source side pressing portion **51***b* of the power source side connecting portion **51** is disposed to connect the first power source side elastic portions **52** in the left-right direction. The power source side pressing portion **51***b* has the width in the left-right direction greater than a total width in the left-right direction of the first power source side elastic portions **52** arranged in parallel with the distance P2 in between. Similarly, the power source side terminal portion **55** is disposed to connect the second power source side elastic portions **54** in the left-right direction. Further, the power source side terminal portion **55** has the width in the left-right direction greater than a total width in the left-right direction of the second power source side elastic portions **54** arranged in parallel with the distance P2 in between.

In the first embodiment, the total width in the left-right direction of the power source side wide width portions **53** arranged in parallel with the distance P2 in between is greater than the width in the left-right direction of the power source side pressing portion **51***b* and the power source side terminal portion **55**. It should be noted that the width of the power source side connecting portion **51** in the left-right direction and the width of the power source side terminal portion **55** in the left-right direction may be set arbitrarily, and may be set, for example, to be greater than the total width in the left-right direction of the power source side wide width portions **53** arranged in parallel as three members.

An operation of assembling the electrical connector **1** will be explained next with reference to FIGS. **2** and **5**.

First, the connection terminals **4** are fixed to the movable housing **3**. More specifically, a user of the electrical connector **1** attaches the movable housing **3** and the connection terminals **4** to a fixing jig (not shown) such that the connection terminals **4** arranged with an identical interval (the two rows of the terminal rows **40**) face the specific locations disposed at the lower portion of the movable housing **3**. In the next step, the terminal portion **45** of each of the connection terminals **4** is inserted upwardly into each of the terminal through holes **27** (each of the movable side pressing grooves **26**) opening and aligned in parallel in the left-right direction. It should be noted that the operation of attaching the terminal portion **45** of each of the connection terminals **4** to the movable housing **3** is substantially concurrently performed relative to the connection terminals **4** using an attachment jig (not shown) having a comb teeth shape. Afterward, when the attachment jig is removed upwardly, the terminal portion **45** of each of the connection terminals **4** is fitted into each of the movable side pressing grooves **26**.

When the terminal portion **45** of each of the connection terminals **4** is fitted into each of the movable side pressing grooves **26**, the terminal side pressing protrusions **49** arranged in the two pairs at the upper side are tightly fitted into the movable side pressing grooves **26**. Accordingly, each of the connection terminals **4** is tightly held with each of the movable side pressing grooves **26** in a state that each of the connection terminals **4** is prevented from being come off. It should be noted that the terminal side pressing protrusions **49** arranged at the lowest side are situated at the lower portion of each of the movable side pressing grooves **26**.

Through the operation described above, the terminal rows **40** are fixed to the movable housing **3**. It should be noted that the operation of attaching the terminal rows **40** to the movable housing **3** is substantially concurrently performed relative to the terminal rows **40** paired in the front-rear direction. Alternatively, the operation of attaching the terminal rows **40** to the movable housing **3** may be performed separately.

Similarly, the power source terminals **5** are fixed to the movable housing **3**. More specifically, the user of the electrical connector **1** attaches the movable housing **3** and the power source terminals **5** to a fixing jig (not shown) such that each of the power source terminals **5** faces the specific location disposed at the lower portion of the movable housing **3**. In the next step, the power source side terminal portion **55** of each of the power source terminals **5** is inserted upwardly into each of the power source through holes **30***d* (each of the power source movable side pressing grooves **28**). It should be noted that the operation of attaching the power source side terminal portion **55** of each of the power source terminals **5** to the movable housing **3** is substantially concurrently performed relative to the power source terminals **5** using the attachment jig described above. Afterward, when the attachment jig is removed upwardly, the power source side terminal portion **55** of each of the power source terminals **5** is fitted into each of the power source movable side pressing grooves **28**.

When the power source side terminal portion **55** of each of the power source terminals **5** is fitted into each of the power source movable side pressing grooves **28**, the power source terminal side pressing protrusions **59** arranged in the two pairs at the upper side are tightly fitted into the power source movable side pressing grooves **28**. Accordingly, each of the power source terminals **5** is tightly held with each of the power source movable side pressing grooves **28** in a state that each of the power source terminals **5** is prevented from being come off. It should be noted that the power source terminal side pressing protrusions **59** arranged at the lowest side are situated at the lower portion of each of the power source movable side pressing grooves **28**.

Through the operation described above, the power source side terminal portions **55** are fixed to the movable housing **3**. It should be noted that the operation of attaching the power source side terminal portions **55** to the movable housing **3** is substantially concurrently performed relative to the terminal rows **40**. Alternatively, the operation of attaching the power source side terminal portions **55** to the movable housing **3** may be performed separately before or after the terminal rows **40** are fixed to the movable housing **3**.

In the next step, after the terminal rows **40** arranged in the pair in the front-rear direction and the power source terminals **5** disposed at the four locations are fixed to the movable housing **3**, the movable housing **3** is supported on the fixed housing **2**. More specifically, the user of the electrical connector **1** attaches the fixed housing **2** and the movable housing **3** to a fixing jig (not shown) such that the movable housing **3** faces the specific location disposed at the lower portion of the fixed housing **2**. Then, the user moves the movable housing **3** upwardly from the lower edge of the fixed side opening portion **10**.

In the first embodiment, the operation of attaching the connecting portion **41** to the fixed housing **2** may be performed similarly to the operation of attaching the wide width portions **43** to the movable housing **3**. When the attachment jig is removed upwardly, each of the connecting portions **41** (each of the connection side pressing portions **41***b*) is fitted into each of the fixed side pressing grooves **14**. At the same time, each of the power source side connecting portions **51** (each of the power source side pressing portions **51***b*) is fitted into each of the power source fixed side pressing grooves **15**.

When the movable housing **3** is fitted (pushed) into the fixed housing **2**, the connection side pressing protrusions **47** arranged on each of the connection side pressing portions **41***b* in the two pairs at the upper side are tightly fitted into the fixed side pressing grooves **14**. Substantially at the same time, the power source side pressing protrusions **57** arranged on each of the power source side pressing portions **51***b* in the two pairs at the upper side are tightly fitted into the power source fixed side pressing grooves **15**. When the movable housing **3** is fitted (pushed) into the fixed housing **2** to a specific extent, each of the connection side pressing portions **41***b* is tightly held with each of the fixed side pressing grooves **14** in a state that each of the connection side pressing portions **41***b* is prevented from being come off. Further, each of the power source side pressing portions **51***b* is tightly held with each of the power source fixed side pressing grooves **15** in a state that each of the power source side pressing portions **51***b* is prevented from being come off. It should be noted that the connection side pressing protrusions **47** arranged at the lowest side are situated at the lower portion of each of the fixed side pressing grooves **14**.

Through the operation described above, the electrical connector **1** is fully assembled. After the electrical connector **1** is assembled, the electrical connector **1** is placed on the board B**1**. Afterward, the board mounting portion **41***a* of each of the connection terminals **4**, the power source side board mounting portion **51***a* of each of the power source terminals **5**, and the metal member leg portions **16***a* of each of the fixing metal members **16** are fixed to the board B**1** with solder.

In the first embodiment, when the electrical connector **1** is fully assembled, the movable main body portion **21** of the movable housing **3** is situated above the upper edge surface of each of the extending wall portions **12** of the fixed housing **2**. Further, in this state, a small space is created between the lower edge surface of each of the fixed main body wall portions **11** and the board mounting portion **41***a* of each of the connecting portions **41**. More specifically, when the electrical connector **1** is mounted on the board B**1**, the fixed housing **2** is fixed at a position where the fixed housing **2** is slightly floated from the board B**1** through each of the connection terminals **4**.

Further, in the first embodiment, when the electrical connector **1** is fully assembled, each of the connection terminals **4** bridges between the fixed housing **2** and the movable housing **3**. Further, each of the first elastic portions **42**, each of the wide width portions **43**, and each of the second elastic portions **44** become exposed portions contacting with air in the fixed side opening portion **10**. Further, a space (the distance P1) is created between each of the first elastic portions **42**, each of the wide width portions **43**, and each of the second elastic portions **44** arranged adjacently. Further, each of the first elastic portions **42** has the length set such that each of the wide width portions **43** is away from the fixed side inner surface **11***b*. Further, each of the second elastic portions **44** extends toward inside from the upper edge portion of each of the wide width portions **43** inclined outwardly, and has the length such that each of the terminal portions **45** can be inserted into each of the movable side pressing grooves **26**.

Similarly, in the first embodiment, when the electrical connector **1** is fully assembled, each of the power source terminals **5** bridges between the fixed housing **2** and the movable housing **3**. Further, each of the first power source side elastic portions **52**, each of the power source side wide width portions **53**, and each of the second power source side elastic portions **54** become exposed portions contacting with air in the fixed side opening portion **10** and the movement space S2. Further, a space (the distance P2) is created between each of the first power source side elastic portions **52**, each of the power source side wide width portions **53**, and each of the second power source side elastic portions **54** arranged adjacently. Further, each of the first power source side elastic portions **52** has the length set such that each of the power source side wide width portions **53** is away from the fixed side inner surface **12***c*. Further, each of the second power source side elastic portions **54** extends toward inside from the upper edge portion of each of the power source side wide width portions **53** inclined outwardly, and has the length such that each of the power source side terminal portions **55** can be inserted into each of the power source movable side pressing grooves **28**.

In the electrical connector **1** in the first embodiment, as described above, each of the first elastic portions **42**, each of the second elastic portions **44**, each of the first power source side elastic portions **52**, and each of the second power source side elastic portions **54** are capable of elastically deforming, so that the movable housing **3** can move in the front-rear direction and the left-right direction relative to the fixed housing **2**. More specifically, in the connection terminals **4**, a stress is concentrated on the curved portion between each of the connecting portions **41** (each of the connection side pressing portions **41***b*) and each of the first elastic portions **42**, and the curved portion between each of the first elastic portions **42** and each of the wide width portions **43**. Accordingly, mainly the curved portions elastically deform. Similarly, mainly the curved portion between each of the wide width portions **43** and each of the second elastic portions **44**, and the curved portion between each of the second elastic portions **44** and the terminal portions **45** elastically deform.

Further, in the power source terminals **5**, a stress is concentrated on the curved portion between each of the

power source side connecting portions **51** (each of the power source side pressing portions **51***b*) and each of the first power source side elastic portions **52**, and the curved portion between each of the first power source side elastic portions **52** and each of the power source side wide width portions **53**. Accordingly, mainly the curved portions elastically deform. Similarly, mainly the curved portion between each of the power source side wide width portions **53** and each of the second power source side elastic portions **54**, and the curved portion between each of the second power source side elastic portions **54** and the power source side terminal portions **55** elastically deform. As described above, the connection terminals **4** and the power source terminals **5** support the movable housing **3** of the electrical connector **1**, so that the movable housing **3** can move within the fixed side opening portion **10** of the fixed housing **2** in the front-rear direction and the left-right direction.

In the first embodiment, the movable leg portions **22** of the movable housing **3** paired in the left-right direction are disposed within both left and right edge regions of the fixed side opening portion **10**. Further, the specific space G1 is created between the outer side surface of each of the movable leg portions **22** and the inner circumferential wall surface of the fixed side opening portion **10** (refer to FIG. **3**). Further, on both front and rear sides, each of the fixed main body wall portions **11** is situated with the specific space between the inner inclined surfaces **30***b* of the movement regulating blocks **30** paired in the left-right direction. Further, the lower inclined surface **30***c* of each of the movement regulating blocks **30** is inclined by the angle corresponding to the upper inclined surface **11***a* of each of the fixed main body wall portions **11**.

In the first embodiment, each of the engaging blocks **31** formed on each of the movable leg portions **22** is loosely fitted in the engaging space S1 formed below the lateral protruding strip portion **13***a* of each of the board fixing portions **13**. It is configured that the upper surface of each of the engaging blocks **31** abuts against the ceiling surface of the engaging space S1 (the lower surface of the lateral protruding strip portion **13***a*), so that the movable housing **3** does not come off upwardly from the fixed housing **2**. It should be noted that a space substantially the same as the specific space G1 is formed between both left and right side surfaces of each of the engaging blocks **31** and both left and right side surfaces of the engaging space S1.

Accordingly, it is configured such that the movable housing **3** can move in the front-rear direction and the left-right direction inside the fixed side opening portion **10** of the fixed housing **2** within the specific space G1. More specifically, it is configured that the outer side surface of each of the movable leg portions **22** abuts against the inner circumferential wall surface of the fixed side opening portion **10**, and the side surface of each of the engaging blocks **31** abuts against the side surface of the engaging space S1. Accordingly, it is possible to restrict the movement of the movable housing **3** within the specific range.

An operation of connecting the electrical connector **1** to the mating side connector **100** will be briefly explained next with reference to FIG. **1**.

As shown in FIG. **1**, the mating side connector **100** includes a plurality of mating side terminals **101** and four mating side power source terminals **102**. The mating side terminals **101** are arranged in two mating side terminal rows L arranged with an equal interval in the left-right direction. Further, the mating side connector **100** includes a mating side housing **103** having a mating side opening portion (not shown) opened downwardly and a mating side engaging portion (not shown) disposed inside the mating side opening portion for holding the mating side terminal rows L.

In the first embodiment, when the electrical connector **1** is connected to the mating side connector **100**, the user inserts the movable housing **3** of the electrical connector **1** into the mating side opening portion of the mating side connector **100**. It should be noted that the engaging guide portions **25***a* paired in the left-right direction are arranged to guide the movable housing **3** when the movable housing **3** is inserted into the mating side opening portion. At this time, the guide inclined surface **25***b* of the movable housing **3** paired in the left-right direction and the guide groove **25***c* of the movable housing **3** paired in the left-right direction are arranged to guide the mating side engaging portion, so that the mating side engaging portion is inserted into the movable side opening portion **20**. Accordingly, each of the mating side terminals **101** contacts with the terminal portion **45** of each of the connection terminals **4**, and each of the mating side power source terminals **102** contacts with the power source side terminal portion **55** of each of the power source terminals **5**. As a result, the board B**1** is electrically connected to the mating side board B**2**.

As described above, in the electrical connector **1** in the first embodiment, the first elastic portions **42**, the second elastic portions **44**, the first power source side elastic portions **52**, and the second power source side elastic portions **54** are configured to elastically deform, so that the movable housing **3** is capable of moving or shifting relative to the fixed housing **2**. Accordingly, even if the connection terminals **4** are shifted relative to the mating side terminals **101**, or the power source terminals **5** are shifted relative to the mating side power source terminals **102**, it is possible to maintain secure electrical connection between the electrical connector **1** and the mating side connector **100**. It should be noted that when the electrical connector **1** is connected to the mating side connector **100**, the lower edge surface of the mating side housing **103** abuts against the upper surface of each of the movement regulating blocks **30**. Accordingly, it is possible to restrict the movement of the mating side connector **100** in the connecting direction relative to the electrical connector **1**.

As described above, in the electrical connector **1** in the first embodiment, the wide width portions **43** of the connection terminals **4** are exposed between the fixed housing **2** and the movable housing **3**, and have the width in the left-right direction (the parallel arrangement direction) greater than that of the first elastic portions **42** and that of the second elastic portions **44**. Accordingly, the wide width portions **43** have the sectional area greater than those of the first elastic portions **42** and the second elastic portions **44**. Further, the wide width portions **43** are arranged with the distance P1 in between, and the distance P1 becomes relatively small. As a result, it is possible to easily match impedance at least one of between each of the connection terminals **4** or between the connection terminals **4** arranged adjacently. Therefore, it is possible to prevent a high frequency signal from being disturbed due to impedance mismatch, thereby making it possible to properly transmit the high frequency signal at a high speed. Especially, it is possible to effectively transmit the high frequency signal using a differential transmission method.

Similarly, as described above, in the electrical connector **1** in the first embodiment, the power source side wide width portions **53** of the power source terminals **5** are exposed between the fixed housing **2** and the movable housing **3**, and have the width in the left-right direction (the parallel arrangement direction) greater than that of the first power

source side elastic portions **52** and that of the second power source side elastic portions **54**. Accordingly, the power source side wide width portions **53** have the sectional area greater than those of the first power source side elastic portions **52** and the second power source side elastic portions **54**. Further, the power source side wide width portions **53** are arranged with the specific distance in between, and the specific distance becomes relatively small. Further, the first power source side elastic portions **52** are connected with the power source side connecting portions **51** (the power source side pressing portion **51***b*), and the second power source side elastic portions **54** are connected with the power source side terminal portions **55**. Further, the power source side wide width portions **53** have the width in the left-right direction greater than that of the first power source side elastic portions **52** and that of the second power source side elastic portions **54**. Accordingly, it is possible to flow a relatively large amount of an electrical current.

As described above, in the electrical connector **1** in the first embodiment, the first elastic portions **42** and the second elastic portions **44** are formed to be curved relative to the wide width portions **43**, and have the width smaller than that of the wide width portions **43**. Similarly, the first power source side elastic portions **52** and the second power source side elastic portions **54** have the width smaller than that of the power source side wide width portions **53**. Accordingly, the first elastic portions **42**, the wide width portions **43**, the first power source side elastic portions **52**, and the power source side wide width portions **53** are capable of flexibly and elastically deforming. Accordingly, the movable housing **3** is capable of smoothly moving or shifting relative to the fixed housing **2**.

As described above, in the electrical connector **1** in the first embodiment, the first elastic portions **42** are curved relative to the wide width portions **43** of the connection terminals **4** in the direction opposite to that of the second elastic portions **44**. Further, the angle between the wide width portion **43** and the first elastic portion **42** or the angle between the wide width portion **43** and the second elastic portion **44** becomes an acute angle (the angle θ1 and the angle θ2). In other words, the first elastic portion **42**, the wide width portion **43**, and the second elastic portion **44** are arranged to form the substantially Z character shape. Accordingly, it is possible to minimize a distance D (a shift in the front-rear direction) between an extension line S (refer to a projected line shown in FIG. **5**) from a position where each of the connecting portions **41** is held with the fixed housing **2** toward the vertical upside and a position where each of the terminal portions **45** is held (tightly fitted in) with the movable housing **3**.

With the configuration described above, it is possible to minimize an offset amount, and to prevent each of the first elastic portions **42** and each of the second elastic portions **44** from being excessively deformed when the movable housing **3** is moved. As a result, it is possible to smoothly move the movable housing **3** relative to the fixed housing **2**, especially in the front-rear direction (the curved directions of the first elastic portion **42** and the second elastic portion **44**). Further, with the configuration of the power source terminals **5** similar to that of the connection terminals **4**, it is possible to smoothly move the movable housing **3** relative to the fixed housing **2** in the front-rear direction.

In the first embodiment, it should be noted that the number of the connection terminals **4** or the power source terminals **5** is arbitrary. Similarly, the number of the first power source side elastic portions **52**, the power source side wide width portions **53**, or the second power source side elastic portions **54** of the power source terminals **5** is also arbitrary. Further, as described above, the first power source side elastic portions **52** have the width in the left-right direction the same as that of the second power source side elastic portions **54**. Alternatively, the first power source side elastic portions **52** may have a width in the left-right direction different from that of the second power source side elastic portions **54**. Similarly, as described above, all of the power source side wide width portions **53** have the identical width in the left-right direction. Alternatively, the power source side wide width portions **53** may have a width in the left-right direction different from each other. Further, the angle θ1 between the wide width portion **43** and the first elastic portion **42** or the angle θ2 between the wide width portion **43** and the second elastic portion **44** are set to the right angle. It should be noted that, when the angle θ1 and the angle θ2 are set to an acute angle, it is possible to smoothly move the movable housing **3** more effectively.

Further, in the first embodiment, as described above, the electrical connector **1** is mounted on the board B**1** in the standing posture. Alternatively, the electrical connector **1** may be mounted on the board B**1** in a lateral posture, so that the electrical connector **1** is connected to the mating side connector **100** in a direction parallel to the board B**1**. In this case, the extending wall portions **12** (the parallel portions **12***b*) paired in the left-right direction and disposed one side of the fixed housing **2** in the front-rear direction are to abut against the board B**1**. Further, the connecting portions **41** of the connection terminals **4** (the board mounting portions **41***a*) and the power source side connecting portions **51** of the power source terminals **5** (the power source side board mounting portions **51***a*) are extended toward the board B**1** to be fixed with solder.

Second Embodiment

A second embodiment of the present invention will be explained next with reference to FIGS. **8** to **10**. FIG. **8** is a perspective views showing an electrical connector **6** and a mating side connector **200** according to the second embodiment of the present invention. FIG. **9** is an exploded perspective view showing the electrical connector **6** according to the second embodiment of the present invention. FIG. **10** is a sectional view showing the electrical connector **6** taken along a line B-B in FIG. **8** according to the second embodiment of the present invention. In the following description, explanations of components of the electrical connector **6** similar to those of the electrical connector **1** are omitted as necessary. Further, components of the electrical connector **6** similar to those of the electrical connector **1** are designated with the same reference numerals.

As shown in FIG. **8**, the electrical connector **6** is a plug (a meal type) to be attached to a board B**3**. The mating side connector **200** as a receptacle (a female type) is attached to a mating side board B**4**. When the electrical connector **6** is connected to the mating side connector **200**, a pair of the board B**3** and the mating side board B**4** is electrically connected.

As shown in FIG. **9**, the electrical connector **6** includes a fixed housing **7**; a movable housing **8**; and a plurality of connection terminals **9**.

In the second embodiment, the electrical connector **6** is integrally formed of an insulation material such as a synthetic resin and the like, and is formed in a substantially rectangular box shape elongating in the left-right direction. Further, the electrical connector **6** includes a fixed side opening portion **70** opening a lower side and a front side

thereof. The fixed side opening portion **70** is formed such that the movable housing **8** can be retained in the fixed side opening portion **70** with a specific space G2 relative to an outer side surface of the movable housing **8**.

As shown in FIG. **10**, a plurality of fixed side pressing grooves **72** is formed in a rear side surface of a fixed side inner surface **71** constituting a part of the fixed side opening portion **70** such that the fixed side pressing grooves **72** extend upwardly from a lower edge. The fixed side pressing grooves **72** are arranged with an equal interval in between in the left-right direction. Further, each of the fixed side pressing grooves **72** has a C character shaped sectional surface in a plan view.

As shown in FIG. **9**, the fixed housing **7** includes a protruding portion on both left and right side outer side surfaces except an upper portion thereof such that the protruding portion protrudes stepwise outwardly. A metal member fixing hole **73** is formed to penetrate each of the protruding portions, and the metal member fixing hole **73** has a substantially rectangular shape, so that the fixing metal member **16** is tightly fitted into the metal member fixing hole **73**. A pair of contact surface portions **7***a* arranged in the left-right direction is formed on a front edge lower portion of the fixed housing **7** for abutting against the board B**3**.

In the second embodiment, the movable housing **8** is integrally formed with an insulation material such as a synthetic resin and the like. Further, the movable housing **8** includes a movable main body portion **81**; a pair of movable leg portions **82** arranged in the left-right direction; and a movable plate portion **83**. The movable main body portion **81** includes a movable side opening portion **80** opening on a front side thereof, and is formed in a substantially rectangular cylindrical shape. The movable leg portions **82** are formed to extend backwardly from both left and right edge portions of the movable main body portion **81** in the left-right direction. The movable plate portion **83** is formed to connect the movable leg portions **82** paired in the left-right direction. With the movable main body portion **81** and the movable leg portions **82**, the movable housing **8** is formed in a substantially U character shape in the plan view.

In the second embodiment, the movable side opening portion **80** is formed in a substantially cubic shape elongating in the left-right direction in the front view. Further, the movable side opening portion **80** is arranged to accommodate a plurality of mating side terminals **201** of the mating side connector **200**.

In the second embodiment, the movable main body portion **81** includes a pair of movable main body wall portions **84** arranged in the front-rear direction with the movable side opening portion **80** in between; a movable bottom portion **85** arranged to connect rear portions of the movable main body wall portions **84** facing in the up-down direction; and a pair of movable column portions **86** arranged in the left-right direction and formed to support left and right outer edge portions of the movable main body wall portions **84** and the movable bottom portion **85**.

In the second embodiment, each of the movable main body wall portions **84** is formed in a substantially rectangular shape elongating in the left-right direction in the plan view. As shown in FIG. **10**, a plurality of movable side pressing grooves **87** is formed as a recess portion in a movable side inner wall surface **84***a* of each of the movable main body wall portions **84** at an upper portion thereof constituting a part of the movable side opening portion **80**. Each of the movable side pressing grooves **87** is formed to extend in the up-down direction, and is situated at a location corresponding to each of the fixed side pressing grooves **72**, respectively. Further, each of the movable side pressing grooves **87** is formed in a groove shape having a substantially U character shape in the front view, and is formed to extend from a rear edge portion to near an upper edge portion of each of the movable main body wall portions **84**.

In the second embodiment, the movable bottom portion **85** is formed in a substantially cubic shape elongating in the left-right direction, so that the movable bottom portion **85** constitutes a bottom surface of the movable side opening portion **80**. A plurality of terminal through holes **88** penetrating in the front-rear direction is formed in the movable bottom portion **24** at locations corresponding to each of the movable side pressing grooves **87**.

As shown in FIG. **9**, each of the movable column portions **86** is formed in a substantially rectangular column shape. An engaging guide portion **86***a* is formed at an upper edge portion of each of the movable column portions **86**. Further, a lock portion **86***b* is formed on an upper surface of each of the movable column portions **86** for connecting and fixing the mating side connector **200**. Further, a flange portion **89** is formed at a rear edge portion of the movable main body portion **81** such that the flange portion **89** extends from the movable main body portion **81** and a surface of each of the movable column portions **86**.

In the second embodiment, each of the movable leg portions **82** is integrally formed to extend backwardly from the lower edge of each of the movable column portions **86**. An engaging block **82***b* having a substantially cubic shape is disposed at a rear edge portion of each of the movable leg portions **82** such that the engaging block **82***b* protrudes from an outer side surface of each of the movable leg portions **82** in the left-right direction.

In the second embodiment, the movable plate portion **83** is disposed between the movable leg portions **82** paired in the left-right direction, and is connected to each of the movable leg portions **82** and a lower portion of the movable bottom portion **85**. An upper surface of the movable plate portion **83** is inclined upwardly from a substantially center portion thereof in the front-rear direction toward a front side thereof (refer to FIG. **10**).

As shown in FIG. **9**, a plurality of the connection terminals **9** constitutes a terminal row **90** arranged linearly with an equal interval in between in the left-right direction. In the second embodiment, each of the connection terminals **9** has an identical configuration. Accordingly, in the following description, the configuration of one of the connection terminals **9** will be explained with reference to FIGS. **10** and **11**.

FIGS. **11**(*a*) and **11**(*b*) are views showing the connection terminal **9** of the electrical connector **6** according to the second embodiment of the present invention. More specifically, FIG. **11**(*a*) is a plan view showing the connection terminal **9**, and FIG. **11**(*b*) is a side view showing the connection terminal **9**.

In the second embodiment, each of the connection terminals **9** has the configuration similar to each of the connection terminals **4** in the first embodiment. More specifically, the connection terminal **9** includes a connecting portion **91**; a first elastic portion **92**; a wide width portion **93**; a second elastic portion **94**; a terminal portion **95** integrally formed in this order from the rear side to the front side thereof.

In the second embodiment, the connecting portion **91** includes a board mounting portion **91***a* to be electrically connected to the board B**3** with solder and the like, and a connection side pressing portion **91***b* extending upwardly from an inner edge portion (the board B**1**) of the board mounting portion **91***a*.

In the second embodiment, the board mounting portion **91***a* is formed to extend in parallel to the board B**3**. The connection side pressing portion **91***b* is formed to bend perpendicular to the board mounting portion **91***a*. Further, the connection side pressing portion **91***b* is arranged to be fitted into one of the fixed side pressing grooves **72** formed in the fixed side inner wall surface **71** (refer to FIG. **10**). Similar to connection side pressing portion **91***b* in the first embodiment, three pairs of connection side pressing protrusions **97** paired in the left-right direction are disposed on both side surfaces of the connection side pressing portion **91***b*, and the connection side pressing protrusions **47** are arranged with a specific interval in the up-down direction. The connection side pressing portion **91***b* has a length in the up-down direction substantially the same as that of each of the fixed side pressing grooves **72** in the up-down direction. When the connection side pressing portion **91***b* is fitted into one of the fixed side pressing grooves **72**, a rear edge portion of the board mounting portion **91***a* is exposed at the rear side of the fixed housing **7**.

In the second embodiment, the first elastic portion **92** is formed to slightly extend upwardly from an upper edge portion of the connection side pressing portion **91***b*, so that the first elastic portion **92** is capable of elastically deforming.

In the second embodiment, the wide width portion **93** is formed to bend perpendicular to the first elastic portion **92**. Further, the wide width portion **93** is formed to extend toward the front side from an inner edge portion of the first elastic portion **92** and in parallel to the board B**1**. Further, the wide width portion **93** has a length in the front-rear direction substantially the same as a length of the fixed housing **7** in the front-rear direction.

In the second embodiment, the second elastic portion **94** is formed to bend perpendicular to the wide width portion **93**. Further, the second elastic portion **94** is formed to extend upwardly from a front edge portion (one side edge portion) of the wide width portion **93**, so that the second elastic portion **94** is capable of elastically deforming. Further, the second elastic portion **94** has a length in the up-down direction substantially the same as a thickness of each of the movable main body wall portions **84**.

Accordingly, in the second embodiment, in the connection terminal **9**, the connecting portion **91** has a width in the left-right direction the same as that of the second elastic portion **94**, and the first elastic portion **92** has a width in the left-right direction the same as that of the second elastic portion **94**. Further, the wide width portion **93** has a width in the left-right direction the same as a width of the terminal portion **95** in the left-right direction. In other words, the wide width portion **93** has the width in the left-right direction greater than that of the first elastic portion **92** and the second elastic portion **94** in the left-right direction (the parallel arrangement direction).

In the second embodiment, the terminal portion **95** is formed to bend perpendicular to the second elastic portion **94**. Further, the terminal portion **95** is formed to extend upwardly from an upper edge portion (one side) of the second elastic portion **94**, so that the terminal portion **95** extends substantially in parallel to the board B**3**. Further, the terminal portion **95** is configured to be fitted into one of the movable side pressing grooves **87** formed in the movable side inner wall surface **84***a* (refer to FIG. **10**).

In the second embodiment, similar to the terminal portions **45** in the first embodiment, three pairs of terminal side pressing protrusions **99** paired in the left-right direction are disposed on both side surfaces of the terminal portion **95**. A tapered portion **95***b* is disposed at a front edge portion of the terminal portion **95** such that three sides except an outside of the tapered portion **95***b* are chamfered.

In the second embodiment, each of the connecting portion **91**, the first elastic portion **92**, the wide width portion **93**, the second elastic portion **94**, and the terminal portion **95** constituting each of the connection terminals **9** has a length in the extension direction thereof that can be arbitrarily defined according to the length of each of the fixed side pressing grooves **72** and each of the movable side pressing grooves **87**, the thickness of the fixed housing **7** and the movable housing **8**, and the like.

An operation of assembling the electrical connector **6** will be explained next with reference to FIGS. **9** and **10**.

First, the connection terminals **9** are fixed to the movable housing **8**. More specifically, a user of the electrical connector **6** attaches the movable housing **8** and the connection terminals **9** to a fixing jig (not shown) such that the connection terminals **9** arranged with an identical interval in between face the specific locations disposed at the rear portion of the movable housing **8**. In the next step, the terminal portion **95** of each of the connection terminals **9** is inserted toward the front side into each of the terminal through holes **88** (each of the movable side pressing grooves **87**). It should be noted that the operation of attaching the terminal portion **95** of each of the connection terminals **9** to the movable housing **8** is performed using an attachment jig similar to that of the electrical connector **1** in the first embodiment. When the terminal side pressing protrusions **99** of the terminal portion **95** are tightly fitted into each of the movable side pressing grooves **87**, the terminal portion **95** is held in a state that the terminal portion **95** does not come off.

In the next step, after the terminal row **90** is fixed to the movable housing **8**, the movable housing **8** is supported on the fixed housing **7**. More specifically, the user of the electrical connector **6** attaches the fixed housing **7** and the movable housing **8** to a fixing jig (not shown) such that the movable housing **8** faces the specific location disposed at the lower portion of the fixed housing **7**. Then, the user moves the movable housing **8** upwardly from the lower edge of the fixed side opening portion **70**, so that each of the connecting portions **91** (the connection side pressing portion **91***b*) is inserted into each of the fixed side pressing grooves **72**. It should be noted that, similar to the operation in the first embodiment, the operation of inserting the movable housing **8** into the fixed side opening portion **70** is performed using the attachment jig. When the connection side pressing protrusions **97** of each of connection side pressing portions **91***b* are pressed into each of the fixed side pressing grooves **72**, each of the connecting portions **91** is held in a state that each of the connecting portions **91** does not come off.

Through the operation described above, the electrical connector **6** is fully assembled. After the electrical connector **6** is assembled, the electrical connector **6** is placed on the board B**3**. Afterward, the board mounting portion **91***a* of each of the connection terminals **9** and the metal member leg portions **16***a* of each of the fixing metal members **16** are fixed to the board B**3** with solder.

In the second embodiment, when the electrical connector **6** is fully assembled, the fixed housing **7** and the movable housing **8** are arranged in parallel to the board B**3**. Further, the movable main body portion **81** of the movable housing **8** is situated in front of a front edge surface of the fixed housing **7**. Further, in this state, the contact surface portion **7***a* of each of the fixed housing **7** abuts against the board B**3**, and a small space is created between the lower edge surface

of the fixed housing **7** at the rear portion thereof and the board mounting portion **91***a* of each of the connecting portions **91**. More specifically, when the electrical connector **6** is mounted on the board B**3**, the fixed housing **7** is fixed at a position where the fixed housing **7** is slightly floated from the board B**3** through each of the connection terminals **9**. Further, the movable housing **8** is supported at a position where the movable housing **8** is slightly floated from the board B**3**.

Further, in the second embodiment, when the electrical connector **6** is fully assembled, each of the connection terminals **9** bridges between the fixed housing **7** and the movable housing **8**. Further, each of the first elastic portions **92**, each of the wide width portions **93**, and each of the second elastic portions **94** become exposed portions contacting with air in the fixed side opening portion **70**. Further, a space is created between each of the first elastic portions **92** arranged adjacently, and between each of the second elastic portions **94** arranged adjacently.

In the electrical connector **6** in the second embodiment, as described above, each of the first elastic portions **92** and each of the second elastic portions **94** are capable of elastically deforming, so that the movable housing **8** can move in the front-rear direction and the left-right direction relative to the fixed housing **7**. More specifically, a stress is concentrated on the curved portion between each of the first elastic portions **92** and each of the wide width portions **93**. Accordingly, mainly the curved portions elastically deform. Similarly, mainly the curved portion between each of the wide width portions **93** and each of the first elastic portions **92**, and the curved portion between each of the first elastic portions **92** and the terminal portion **95** elastically deform. As a result, the movable housing **8** of the electrical connector **6** is supported with the connection terminals **9** such that the movable housing **8** is capable of moving in the up-down direction and the left-right direction in the fixed side opening portion **70** of the fixed housing **7**.

Similar to the electrical connector **1** in the first embodiment, in the electrical connector **6** in the second embodiment, the movable leg portions **82** of the movable housing **8** paired in the left-right direction are disposed within both left and right edge regions of the fixed side opening portion **70** with the space G2 in between (refer to FIG. **10**). Further, each of the engaging blocks **82***b* formed on each of the movable leg portions **82** is loosely fitted in the engaging space S3 (refer to FIG. **10**) formed inside the fixed side opening portion **70** (the both side surfaces of the fixed housing **7** in the left-right direction). Accordingly, the movable housing **8** does not come off toward the front side from the fixed housing **7**.

In the second embodiment, the electrical connector **6** is fitted into the mating side connector **200**, so that the electrical connector **6** is electrically connected to the mating side connector **200**. It should be noted that the configuration of the mating side connector **200** and the operation of connecting the electrical connector **6** to the mating side connector **200** are similar to those in the first embodiment, and explanations thereof are omitted.

In the electrical connector **6** in the second embodiment, it is possible to obtain an effect similar to that of the electrical connector **1** in the first embodiment. More specifically, it is possible to easily match impedance at least one of between each of the connection terminals **9** or between the connection terminals **9** arranged adjacently. Therefore, it is possible to properly transmit the high frequency signal at a high speed. Further, the first elastic portions **92** and the second elastic portions **94** are capable of flexibly and elastically deforming. Accordingly, the movable housing **8** is capable of smoothly moving or shifting relative to the fixed housing **7**. It should be noted that the number of the connection terminals **9** is arbitrary.

In the second embodiment, the first elastic portion **92** of each of the connection terminals **9** may be formed in a substantially L character shape in the side view as indicated with a phantom line in FIG. **10**, so that the connecting portions **91** and the first elastic portions **92** are curved.

As described above, in the electrical connector **6** in the second embodiment, the wide width portion **93** of each of the connection terminals **9** is formed to extend substantially in parallel to the board B**3**, and the present invention is not limited to the configuration. Alternatively, similar to the wide width portions **43** of the connection terminals **4** in the first embodiment, the wide width portion **93** of each of the connection terminals **9** may be inclined (not shown). In this case, it is preferred that the wide width portion **93** of each of the connection terminals **9** is inclined downwardly from the upper edge portion of the first elastic portion **92**, and extends toward the front side (one side). In other words, it is preferred that an angle between the wide width portion **93** and the first elastic portion **92** and an angle between the wide width portion **93** and the second elastic portion **94** become an acute angle (less than 90°), respectively.

In the second embodiment, similar to the connection terminals **4** in the first embodiment, the first elastic portion **92**, the wide width portion **93**, and the second elastic portions **94** are arranged to form the substantially Z character shape. Accordingly, it is possible to minimize a distance (a shift) between an extension line extending horizontally from a position where each of the connecting portions **41** is held with the fixed housing **7** toward the front side (in the connecting direction of the mating side connector **200**) and a position where each of the terminal portions **95** is tightly fitted in the movable housing **8**. With the configuration described above, it is possible to further smoothly move the movable housing **8** relative to the fixed housing **7** in the up-down direction (the direction connecting inside and outside).

In the first and second embodiments described above, the electrical connector **1** and the electrical connector **6** are explained as the preferred embodiments of the present invention, including various preferred technical features. It should be noted that the technical scope of the present invention is not limited to the features unless the description limiting to the features exists. Further, it should be noted that the components in the embodiments may be modified or replaced with existing components, or the configurations may include existing components.

The disclosure of Japanese Patent Applications No. 2013-166099, filed on Aug. 9, 2014, is incorporated in the application by reference.

While the present invention has been explained with reference to the specific embodiments of the present invention, the explanation is illustrative and the present invention is limited only by the appended claims.

What is claimed is:

1. An electrical connector to be connected to a mating side connector, comprising:

a fixed housing to be fixed to a board;

a movable housing arranged to be movable relative to the fixed housing; and

a plurality of terminals disposed between the fixed housing and the movable housing, and arranged in an arrangement direction with a specific interval in between,

wherein each of said terminals includes:

a connecting portion held with the fixed housing and to be fixed to the board;

a first curved portion connected to the connecting portion;

a terminal portion held with the movable housing and to be electrically connected to the mating side connector;

a second curved portion connected to the terminal portion and situated entirely below the movable housing; and

an inclined portion connected between the first curved portion and the second curved portion so that the first curved portion is curved in a direction opposite to a direction that the second curved portion is curved,

each of said terminals extends toward a connection direction with the mating side connector,

said inclined portion extends toward the connection direction with the mating side connector,

said inclined portion is inclined so that an angle between the inclined portion and the first curved portion becomes an acute angle, and

said inclined portion is inclined so that an angle between the inclined portion and the second curved portion becomes an acute angle.

2. The electrical connector according to claim **1**, wherein said first curved portion has a first length in a direction perpendicular to the arrangement direction and the connection direction,

said second curved portion has a second length in the direction perpendicular to the arrangement direction and the connection direction, and

said first length is greater than the second length.

3. The electrical connector according to claim **2**, wherein said inclined portion has a third length in the connection direction, and

said third length is greater than the second length.

4. The electrical connector according to claim **1**, wherein said movable housing includes a holding portion for holding the terminal portion, and

said second curved portion is situated entirely below the holding portion.

5. The electrical connector according to claim **1**, wherein said terminal portion is formed substantially in a flat linear shape.

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